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VOLUME XLIX

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JANUARY, 1935



THE CANADIAN FIELD NATURALIST

A Historical Review of the Woodcock



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"Mother Love."

Photograph by H. Mousley

The Canadian Field-Naturalist


VOL. XLIX

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No. 1

A HISTORICAL REVIEW OF THE HABITS AND ANATOMY OF THE WOODCOCK. COMPILED FROM THE EARLIEST DRAWINGS AND ACCOUNTS TO THOSE OF THE PRESENT DAY.

By HENRY MOUSLEY

WO FACTORS are responsible for the present paper, the author's fortunate engagement in compiling a general catalogue of the 5000 original drawings and paintings of mammals, birds, insects, flowers, etc., in the Blacker and Emma Shearer Wood Libraries of McGill University, and his early fondness for Woodcock lore, without which, the drawings presently to be discussed would probably never have been specially noticed. Already these famous collections have produced pictures of more than passing interest, some of which have already been described by the Librarian. Dr. Gerhard R. Lomer¹, Dr. Casey A. Wood², Dr. Alexander Wetmore³, and the writer⁴.

It was while examining these drawings, many of which are contained in albums or books, that the writer came across an old volume containing 310 drawings and sketches by George Cumberland, many of which are most beautifully finished. On the front page of this volume is the following inscription, "This volume of 310 studies from nature, in various branches of natural history, the amusement of many pleasant hours of his father George Cumberland—he presents to his son Sydney, as a proof of his esteem and as an example of vacant hours, not mispent.

June 28th, 1846. G. Cumberland.
G. Cumberland was born 27th Nov. 1754. died August 8th, 1848.
Sydney Cumberland died March, 1868."

As will be noticed, the father was ninety-two years old when he presented the book to his son, just two years before his death, the signature naturally being in a somewhat shaky hand. Many of the drawings are coloured, ranging in date from 1798 to 1830, whilst others again, are merely pen and ink, or pencil sketches, all, however, more or less highly finished and embracing almost every subject under the sun, from elephants to the eyes of birds, accompanied, for the most part, with explanatory notes. All of the drawings were pasted in the book, but not numbered, and it was while doing this that my attention was drawn to those of the Woodcock, Nos. 49, 49a, 52 and 112, none of which, however, is signed, or dated, but from the style of the writing, and kind of paper used, the most important one, No. 49 depicting the flexibility of the upper mandible of the Woodcock's bill, may safely be ascribed, I think, to between 1802 and 1805, as it agrees in all respects with some of the other drawings of this period, which are either signed, or dated. From the moment I realized the early date of the drawing, I knew I had made "a find" so to speak, as the discovery of the flexibility of the upper mandible of the Woodcock's bill has apparently been attributed to Gurdon Trumbull in 1890! whereas, the present drawing clearly proves that Cumberland knew about it in 1805, and as we shall see later, Naumann, in 1799, a matter of 91 years earlier! This interesting fact decided me to gather together and record in one place the scattered references to the anatomy and habits of this most delightful and fascinating bird, dear, not only to the hearts of all true sportsmen, but to naturalists as well. At this point, it may prove interesting to draw attention to the fact that amongst the 156 famous feather pictures by Dionisio Minaggio (ca. 1618), in the McGill collections, and already referred to, are two of the Woodcock, one of which, No. 34, is here reproduced.

¹ Feather pictures of the *Commedia Dell'Arte*, By Gerhard R. Lomer, *Theatre Arts Monthly*, September, 1930.

² Lady (Elizabeth) Gwillim — Artist and Ornithologist, by Casey A. Wood, *Ibis*, July, 1925.

Two hitherto unpublished pictures of the Mauritius Dodo, by Casey A. Wood, *Ibis*, October, 1927.

³ The Rabié Paintings of Haitian Birds, by Alexander Wetmore, *Auk*, October, 1930.

⁴ Catalogue of Original Paintings of Birds, selected from the Emma Shearer Wood Library, McGill University, by Henry Mousley, A.O.U. Meeting, Quebec, 1932.



Although these pictures have no bearing on the flexibility of the upper mandible of the Woodcock's bill, still, they are interesting from the peculiarity of their make up and very early date, being in all probability the oldest bird skins known to ornithologists, as well as incidentally for the fact that the Woodcock should have been one of the birds chosen for representation.

It is proposed in the present review to include both the European and American species (*Scolopax rusticola* and *Philohela minor*), seeing that their general habits and anatomy are almost identical, and that at one time they were in the same genus, being known as *Scolopax rusticola*, and *Scolopax minor*, but owing to the attenuation of the first three primary feathers of the wing, and the absence of barring on the breast and flanks of the American bird, it has since been thought best to place it in a genus by itself, that of *Philohela*, it now being known as *Philohela*

minor, instead of *Scolopax minor*. The nesting habits of both are practically the same, the spot usually selected for the nest being at the foot of some small tree or shrub. The set of eggs, which are laid early in the season, either April or May, consists of 3 or 4, usually 4, very rarely indeed 5. The incubation period occupies about 21 days, the young leaving the nest some few hours after hatching. Should the favourite feeding grounds be at some distance from the nesting place, which is often the case, it is said that the chicks are carried to them at night and brought back to the woods at dawn. Possibly the earliest, or at least, the most generally quoted reference to the European Woodcock, is that of Scopoli², who, in 1769, refers to this habit of carrying the young in the following words: "*pullos rostro portat fugiens ab hoste*", (flying from the enemy,

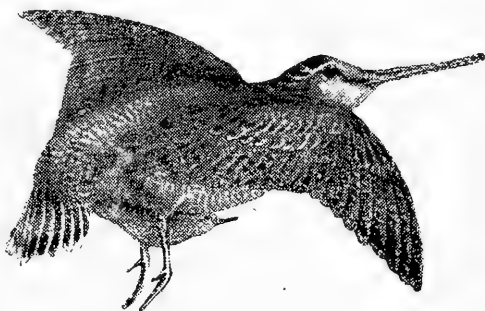
² Annus Primus, Historico-Naturalis, by Giovanni Antonio Scopoli, Lipsiae, 1769.

it carries its young in its beak). Gilbert White on reading Scopoli's statement was incredulous, "but candour", he added, "forbids me to say absolutely that any fact is false because I have never been witness to such a fact. I have only to remark that the long unwieldy bill of the woodcock is perhaps the worst adapted of any among the winged creation for such a feat of natural affection". Had Scopoli omitted the word *rostrum*, his statement might have been less open to criticism, the fact being, that not one of the subsequent observers who have confirmed his assertion that Woodcocks do carry their young, agrees with him that they are carried in the bill. Nor do they agree upon this point among themselves. Strange as it may seem, it took 110 years of scepticism before the matter was finally set at rest by Harting⁶, in 1879, who, after a lengthy list of undoubted records, ends up his article in the following words:—"Thus it is placed beyond doubt that the woodcock is able to transport its young, in various positions, from place to place, not only when flying from its enemies, but also when going out to feed and returning. This curious habit is not confined to the European Woodcock but, according to Audubon and others, has been observed also in the American species. These observations confirm our impression that, while the old birds are able to carry their young in two or three different positions that which has been so skilfully depicted by Mr. Wolf, in the accompanying engraving, is probably the one most commonly employed."



The late Abel Chapman, however, in his *Borders and Beyond*, says on page 383, "For many

years a question used to be discussed as to woodcocks carrying their young; but the matter never especially interested me, until, on 3rd August 1915, I happened to see it with my own eyes. This was in Houxty wood, Northumberland, and since then I have witnessed the performance on many occasions. During the war this wood was largely felled for military purposes and the area thus cleared, and subsequently replanted, has become a specially favoured resort of our longbilled friends. The annexed sketch,



WOODCOCK CARRYING YOUNG.
Houxty Wood, June 15, 1920.

made there on 15th June 1920, shows exactly how the feat is accomplished. That particular woodcock rose on the hillside a trifle above me, slowly flapping by close in front, and looking back at me over her shoulder. What first struck my attention was the curiously depressed tail—held almost vertical; then the mother's feet, hanging down below; finally the youngster, with its very short beak, pressed between its parent's thighs. Since then I have witnessed many similar exhibitions—indeed in summer they are almost daily on view."

It is to be regretted that so far no one has ever been fortunate enough to obtain a photograph of the female in the act of removing her young, at least, so far as I am aware.

The next early reference concerns the popular belief that Woodcocks lived by suction; but those who have observed them in confinement know that they have an almost insatiable appetite for earthworms, which the birds seek by probing soft ground with their highly sensitive and flexible bill. This fact seems to have been first placed on record by Bowles⁸, who noticed it in the royal aviary at San Ildefonso, in Spain, in 1775. The translation of his account from the

⁶ J. E. Harting, *Zool.*, 1879, pp. 433-440

⁷ *The Borders and Beyond* — Arctic, Cheviot, Tropic, by Abel Chapman, 1924, p. 383.

⁸ *Introducción a la Historia Natural, y a la Geografía física de España*, by D. Guillermo Bowles, Madrid, 1775.

Spanish, which I believe has not appeared in print before, and for which I am indebted to Dr. Walter of McGill University, is as follows: "Returning to my purpose I am going to tell you the little that remains for me to tell of San Ildefonso. When the Queen Mother (may her soul rest in peace) lived in that place, her son Prince D. Luis, who kept her company, had a very curious aviary in which he reared a large number of rare birds, worthy of being observed by naturalists. I used to come and spend leisure moments examining these birds, but to cut a long story short, I shall merely state here what I observed concerning the woodcocks there. I was very greatly astonished to see some that had lived in confinement there for many years. My astonishment arose from the difficulties that many northern naturalists have experienced in rearing these birds since they were never able to guess what their natural food was or procure it for them. In this aviary, belonging to the Prince, the woodcocks were cared for in this fashion:— There was a perennial stream to keep the earth moist, for that is what these birds like. In the middle of it was a pine tree and some bushes which served the same purpose.

"They used to bring from the wood fresh sods, the fullest with worms that could possibly be found, and though these worms hid themselves as well as they could the woodcock as soon as he felt hungry sought them by his sense of smell and digging his long beak into the earth, never farther than up to the nostrils, immediately brought out the worm and raising his beak upwards towards the heavens, extended the worm through the whole length of it and so gulped it down gently without any visible movement of swallowing. The whole of this operation, as I have said, took place in a moment, and the movement of the woodcock was so even and imperceptible that the bird did not seem to be doing anything. I did not observe a single instance in which it failed to get its prey, and both for this reason and because I had noticed that he never dug his beak further down than the orifice of the nostrils, I inferred that it was the sense of smell that guided him in looking for and procuring his food. Everyone knows that the legs of the woodcock form an excellent dainty, and that its intestines with the matter that they contain are, when spread over toasted bread and cooked, delicious to the palate of epicures. But neither do the latter know, nor do I myself know, what property there is in the digestive organs of this bird to enable it in a moment to convert the flesh of a worm into such a delicious dainty." The above facts have been

corroborated by other observers, and especially, by Montagu⁹, in 1813, who says:—"A woodcock in our menagerie very soon discovered and drew forth every worm in the ground which was dug up, to enable it to bore: and worms put into a large garden-pot covered with earth five or six inches deep, are always cleared by the next morning, without one being left. The enormous quantity of worms that these birds eat is scarcely credible; but really it would be the constant labour of one person to procure such food for two or three woodcocks. The difficulty of collecting a sufficiency of such precarious aliment, determined us to try if bread and milk would not be a good substitute; and we found that by putting clean washed worms into that mess, the bird soon acquired a taste for this new food, and will now eat a large basin of bread and milk in twenty-four hours, besides worms. Lord Stanley has had a woodcock in confinement these three years, which is frequently fed on raw flesh.

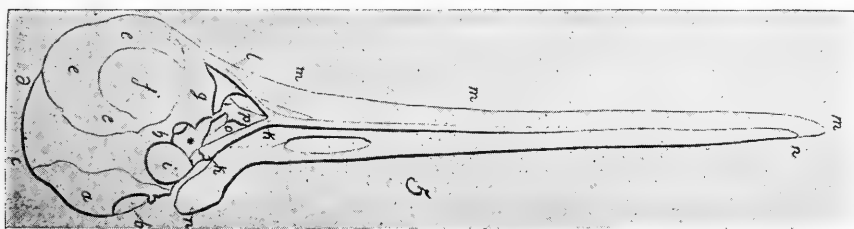
"From experience there appears great probability that many birds of a similar habit to the Woodcock, or the Ruff, might be induced to change their diet by degrees in the manner stated that would otherwise starve by a total change at first. The common Godwit is, like the Ruff, usually fattened by such soft food; but the Knot will starve before he will touch it, and therefore requires inducement to change his diet. In this manner we induced a Curlew to change his natural food, as before related." In this same Dictionary, as it so happens, Montagu gives us one of the very earliest records we have of bird banding, the bird in question, curiously enough, being no other than a Woodcock. The account is as follows:—"In the winter of 1797, the game-keeper of E. M. Pleydell, Esq., of Whatcombe in Dorsetshire, brought him a woodcock alive and unhurt, which he had caught in a net set for rabbits. Mr. Pleydell scratched the date upon a bit of thin brass, and bent it round the woodcock's leg, and let it fly. In December, the next year, Mr. Pleydell shot this bird, with the brass about its leg, in the same wood where it had been first caught. Communicated by Sir John Trevelyan, Bart." We now come to the year 1799, a most important one, since in it we get the first reference to the mobility of the tip of the upper mandible of the Woodcock's bill, which discovery was made by Naumann¹⁰, who says in the third part of

⁹ *Supplement to the Ornithological Dictionary or Synopsis of Birds*, by Geo. Montagu, 1813.

¹⁰ *Naturgeschichte der Land- und Wasser-Vögel des Nördlichen Deutschlands*, by Johann Andreas Naumann, 1799, and Supplement, 1804.

his "*Naturgeschichte der Vögel des nördlichen Deutschlands*" (page 5). "The beaks of woodcocks are mobile; they can open without moving the jaws." Later on, in the first number of the Supplement to the above work, published in 1804, he adds:—"I have been not a little surprised to find that this remark has been called inaccurate. It is nevertheless a matter of common observation. If you observe woodcocks carefully and at close quarters you will see quite distinctly how in yawning they bend the upper and the lower bill apart without in the least separating the jaws. In tame woodcocks of which I always keep a few this observation may be made

more than once every day. Whoever is unwilling to believe this should take a live woodcock pierce its neck with a quill in order to kill it, and then hold its bill with two fingers close to the head. He will then see that in its death agony it opens the fore part of the bill wide by bending the upper part of the bill upwards, the lower downwards." Leaving these remarks of Naumann's for the present, we next come to an important work by Nitzsch¹¹, published in 1811, in which we find the first drawing, so far as I know, of the skull and beak of a Woodcock, which is here reproduced.



Five years later, or in 1816, Nitzsch published another paper¹², entitled, *Concerning the movement of the upper beak of Birds*, in which he speaks of Naumann's work as follows:—"It is surprising that this mode of moving the upper beak has remained unknown to anatomists and physiologists [the entotympanic muscle thought to effect the raising of the upper mandible was first described in 1748 by Hérissant¹³, who, however, did not realize its function] and that no ornithological author before Naumann has thought of it. Naumann refers to this movement in the third part of his *Naturgeschichte der Land- und Wasser- Vögel des nördlichen Deutschlands*" (p. 5) as follows:—"The beaks of woodcocks are mobile; they can open without moving the jaws." As this remark has been too hastily pronounced incorrect by others, Naumann adds in the first number of the supplement (p. 57) "that those beak movements are unmistakable in living woodcocks, and that a woodcock, killed by a puncture in the neck, while the beak is firmly held closed at the root, nevertheless in its death agony opens the beak wide in front, bending the upper beak upwards and the lower downwards. Although, this passage does not give a clear representation of the jaw movement of the woodcock any more than the former one, and although on the one hand it contains an obvious inaccuracy because when both jaws are firmly closed at the root, the lower jaw cannot possibly bend downwards

and a partial bending of the point of the lower jaw does not take place, on the other hand Naumann very rightly says the woodcock can move the point of its beak without being obliged to draw down the lower jaw. Although all the muscles which open the lower jaw must move correspondingly if the turning of the articular bone and the pushing forward of the upper beak is to ensue, as soon as the point of the bone is fixed, those that draw the lower jaw and do not at the same time draw down the upper jaw may work, and then the raising of the upper jaw without moving the lower jaw may be effected. I have observed this mode of opening the beak by the raising of the upper jaw only, perhaps hitherto considered impossible. not only in woodcocks but also sometimes in other living birds; but it seems especially and regularly to take place in woodcocks and to be the main reason of the otherwise unexampled position and shortening of the back part of the jaw, as I hope to explain in another place. I have described in detail this position of the jaw and the very peculiar formation of the skull whereby the woodcock family distinguishes itself from all other known birds in my "*Osteographischen Beiträgen zur Naturgeschichte der Vögel*."

¹¹ *Osteographische Beiträge zur Naturgeschichte der Vögel*, by Christian Ludwig Nitzsch, Leipzig, 1811.

¹² *Über die Bewegung des Oberkiefers der Vögel*, in *Deutsches Archiv für die Physiologie*, 2nd Band 3rd Heft, 1816.

¹³ *Histoire de l'Académie Royal des Sciences*. 1748-52, pp. 345-86.

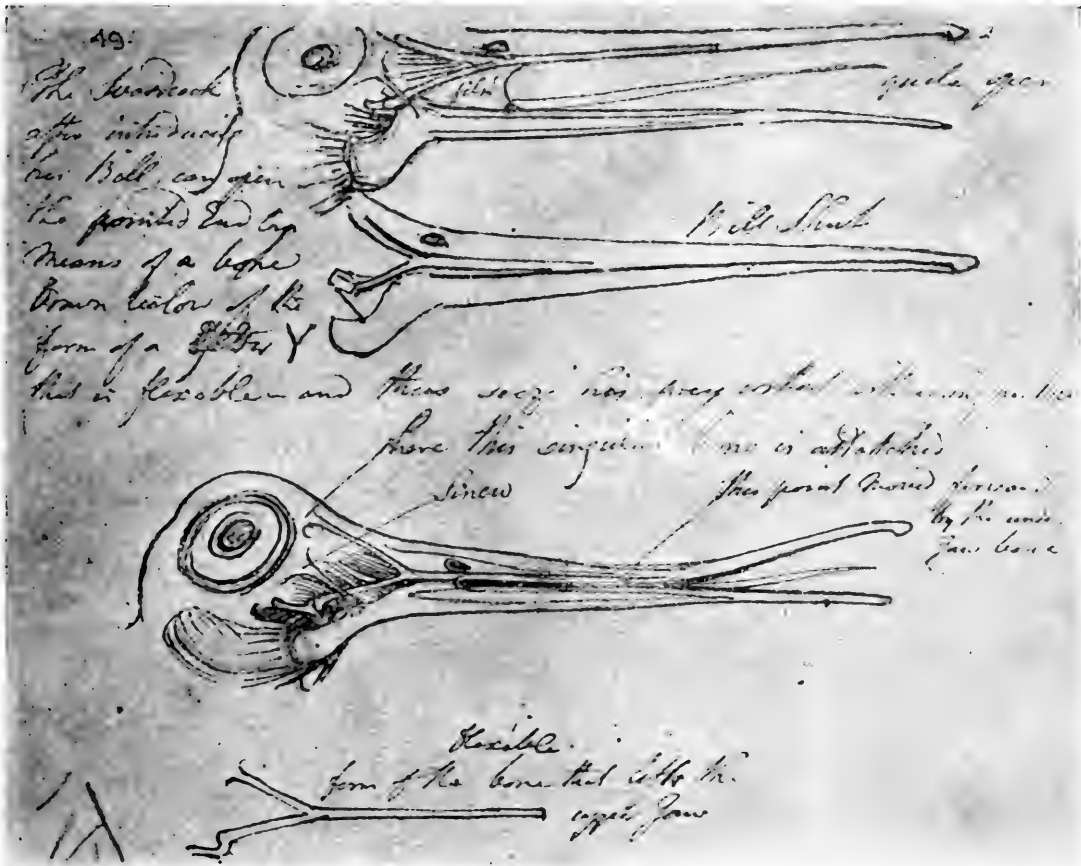
"The mode of the jaw movement of this species was not known to me then: but my supposition that all true woodcocks are in accord in the main in that respect, at least in all home species, I have since found completely confirmed. The Ibis seem to be able to raise the front part of their upper jaw in the same way; at least I noticed such a condition of the beak in the Glossy and Scarlet Ibis (*Ibis falcinellus* and *Ibis ruber*), which favours this conclusion. I found the same formation, contrary to my expectation, in the Hummingbird (*Trochilus*), which certainly only moves the extreme point of the upper jaw and this corresponds perfectly with its mode of nutrition."

At this juncture, it would now seem desirable to consider Cumberland's four Woodcock drawings, and to say something more concerning the artist himself. From information kindly furnished me by Mr. Lawrence Binyon of the British Museum, through Messrs. Wheldon & Wesley of London, from whom the book of drawings was purchased by Dr. Casey Wood in 1925, we learn that:—"George Cumberland was born in 1754. He was a cousin of Richard Cumberland the dramatist, and was employed at the Royal Exchange Assurance Office. He studied at the Royal Academy School as an amateur at the same time as Flaxman. Very likely it was through Flaxman that he got to know William Blake, the poet and artist. He became one of Blake's best friends and Blake helped him with the technique of etching. According to Farington's Diary, vol. 1, he had about £500 pounds a year left him and ran away with a Mrs. Cooper, wife of an architect with whom he lodged. He afterwards compromised the matter with Cooper in Paris for one thousand pounds. He published *Thoughts on Outline*, 1796, and an album containing 221 drawings, which is in the British Museum, and which includes some of the designs engraved in that work. He also published lithographical views of Italy, 1821. The copy of Blake's book *Europe*, in the British Museum, contains quotations in what has recently been discovered to be Cumberland's writing; and there are letters of his in the MS. Department of the Museum.

"In middle life Cumberland went to live in Bristol. He died in 1848. This, which is not all to be found in one book, about sums up what is at present known about Cumberland."—I might add, however, that a very good account of the early life of the brothers Richard Denison and George Cumberland—as well as a first-hand picture of the life of the period—will be found in "The Cumberland Letters", 1771-84, edited by Clementina Black, in 1912. As regards

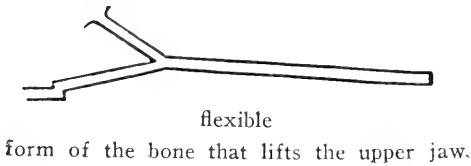
the latter brother's residence at Bristol for a time, accounts for the number of sketches the album contains of animals and birds in the Zoological Gardens at Clifton, Bristol which brings vividly to the memory of the writer many happy hours spent in those same gardens while pursuing his early academic studies at Clifton College, the grounds of which practically adjoined those of the Zoo, being separated only by a turnpike road. Now, as I have already remarked, Cumberland seems to have had an aptitude for drawing everything under the sun, just as the particular subject appealed to him at the moment, or took his fancy, nevertheless, it does seem strange he should have alighted on a subject that no one knew anything about at the time, unless, being a German scholar, he had read Naumann's *Naturgeschichte der Vögel des nördlichen Deutschlands*, of 1799, or Supplement of 1804, wherein the flexibility of the upper mandible of the Woodcock's bill is recorded for the first time. On reading this, Cumberland's love of investigation would naturally be aroused, and he probably proceeded to investigate for himself, not only the flexibility of the bill, but also other parts of the Woodcock's anatomy, which would account for the subsequent drawings of the gizzard, which drawing by the way is on the reverse side of the sketch of the bill, together with the separate ones of the head and eyes also. No matter from what angle the matter is viewed, the fact stands out, that Cumberland's drawing is the very first one to depict the tip of the upper mandible in a raised position, with a description of how this is effected, even if the drawing was made at a later date than 1805, as I have assumed, say after 1811, when Nitzsch's drawing appeared in his *Osteografische Beiträge zur Naturgeschichte der Vögel*, a drawing which neither depicts the upraised tip of the bill, nor how it might be accomplished, for the very simple reason, as Nitzsch afterwards says, in 1816, that the mode of the jaw movement of this species was unknown to him when his drawing was made and since it was not until 1867, that another one appeared, that of Hoffman it cannot be said that Cumberland derived his information from it, seeing that he died in 1848, or just nineteen years previous to the appearance of Hoffmann's work.

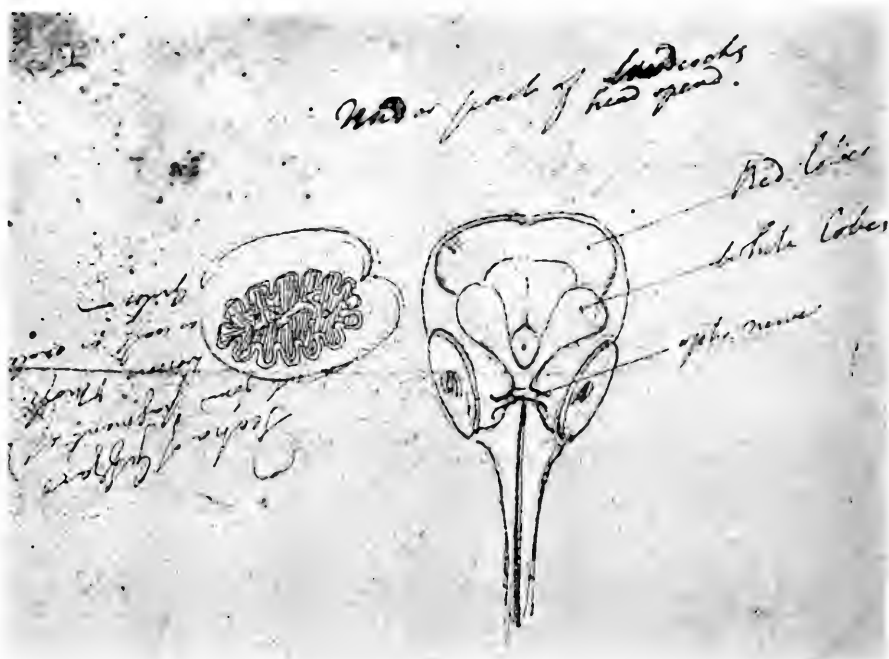
No doubt what has been said regarding the drawing of the bill, may equally apply to those of the gizzard and under part of the head, the head with "feeler" (the cornu of the hyoid), and the eye, as doubtless they represent the very first drawings of these parts of a Woodcock's anatomy.



The description written on this drawing, No.49, is as follows:

"The Woodcock after introducing his bill can open the pointed end by means of a bone—drawn below—of the form of a letter Y—that is flexible—and thus seize his prey without withdrawing his bill. Here this singular bone is attached; sinew; this point moved forward by the under jawbone





The description on this drawing, No. 49a (on the reverse side of No. 49) is as follows:

Head or part of woodcock's head opened; underpart [in pencil]; red lobes, white lobes, optic nerve.

Section of gizzard in which were found fragments of worms and moss, as well as small grubs. [To read this, the drawing must be turned round.]



The description on this drawing, No. 52 [see page 10] is as follows:

From aa to a, a gristly substance circular that a woodcock and snipe has capable of extension and which at aa enters his bill—it seems a feeler.

It is interesting to notice that the ear in this drawing is wrongly sketched, at the back, instead of in front of, the eye, where it should be, as discovered and pointed out by Chas. Whymper so many years later, in 1907. The "feeler" or "feelers" are the cornua of the hyoid.



The description on this drawing, No. 112, is as follows:

Optic nerve oblong; Eye of woodcock; form

of crystalline; Retina all dark brown; Optic nerve forms a long white streak; Crystalline of a Jay in other respects like the woodcock.

The present writer has referred to Dr. Casey Wood's *The Fundus oculi of Birds*, 1917, and finds that although there is no drawing of the eye of a Woodcock the optic nerve and pecten of the eye of the Jay there portrayed corresponds exactly with that of the Woodcock, as stated and drawn by Cumberland. A somewhat long gap now ensues in the history of the Woodcock; in fact, until the year 1842, when Loche¹⁴, in his explorations in Algeria, has something to say on the structure of the bird's bill, although, incidentally, his remarks did not appear in print until 1867, the work coming out in ten volumes (1843-67), that dealing with the birds, bearing the last named date. In part, he says:-

"The structure of the bill is remarkable in that independently of the olfactory nerves which run throughout its length and re-unite at its tip, it is provided with a pair of muscles of which the mechanism is altogether peculiar. Thus, when the bird has plunged its beak into the mud or into the earth to seek the worm or insect it desires, only the tip of this organ has the faculty of opening to seize its prey; after which, once pulled out of the ground, and the beak itself freed, the latter opens quite easily to swallow up the booty which until then was retained by the very tip alone. In the evening the woodcock before entering the woods goes to find a spring to wash its bill and feet. The woodcock breeds only very rarely in Algeria, from the end of February it effects its return passage and comes

¹⁴ Loche *Expl. Scient. de l'Algérie*, 10 vols. folio, Paris, 1848-67.

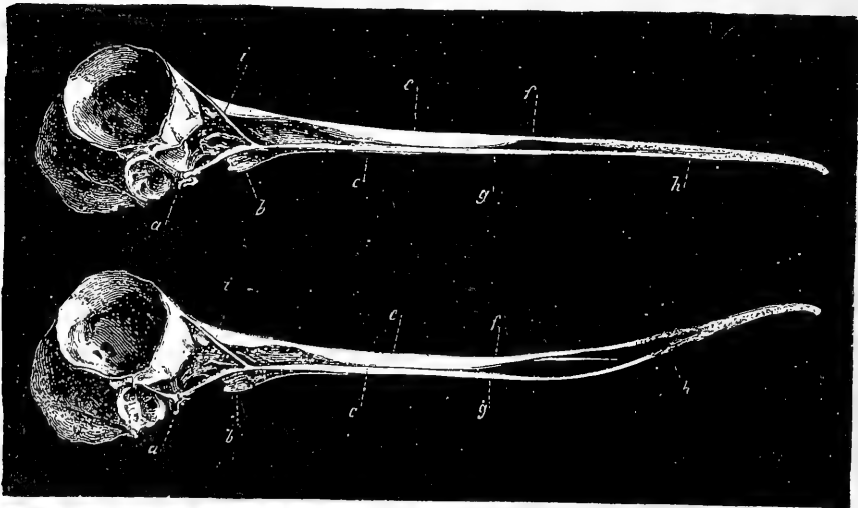
back to nest in the forests of the centre of Europe." Newton, in his *Dictionary of Birds*, published in 1896, says in a footnote on page 1045:- "The pair of muscles said by Loche (*Expl. Scient. de l'Algérie*, II, p. 293) to exist in the maxilla, and presumably to direct the movement of the bill, do not seem to have as yet been precisely described". The same year that Loche's work appeared, *i.e.*, 1867, saw, also the production of Hoffmann's¹⁵ fine monograph on the Woodcock, with three figures of the bird's head and bill, which are here reproduced, together with a description translated from the German.

Newton, in reviewing this work in the *Ibis* of 1868—of which he was then Editor—says in part:—"Dr. Julius Hoffmann has published a very good monograph on the Woodcock. He first gives a long and detailed description of the bird, particularly directing attention to a curious peculiarity of its bill, the upper mandible of which is capable of voluntary upward movement—a property that seems to have hitherto almost entirely escaped notice, but now sufficiently well established and illustrated by a woodcut. Finally the American species (*Scolopax minor*) is considered, much in the same manner, but at less length than the European, and chiefly from Audubon's writings; and thus ends this very

good monograph on the natural history of "Timber-doodles". Quoting from the German as nearly as possible, Hoffmann says:—"The peculiar mechanism of the upper beak is so interesting and plays such an important role in the nutrition of the woodcock that we will not refrain from dealing more minutely with this object. The woodcock is able to bend the front third part of the upper beak upwards without at the same time opening the beak, *i.e.*, without bending the lower beak downwards. Even in specimens that have been killed we can bring about this movement of the point of the upper beak by pressing with two fingers below the eyes on the cheeks of the bird. Chr. L. Nitzsch described in detail fifty years ago this peculiar flexibility of the front of the upper beak of the woodcock and at the same time he showed that a similar mechanism working on a shorter part of the point of the beak is seen not only in a number of other birds of the woodcock family, such as snipe, godwit, curlew, and ruff, but also in the ibis and in hummingbirds.

"I shall endeavour to demonstrate by referring to the accompanying illustrations the manner by which the raising of the upper point of the beak takes place (which is easy to see in a woodcock's skull). The upper sketch shows the woodcock-beak at rest, the lower, the same with raised point.

¹⁵ Die Waldschnepfe, Ein monographischer Beitrag zur Jagd-200'93'e, by Dr. Julius Hoffmann, 1867.

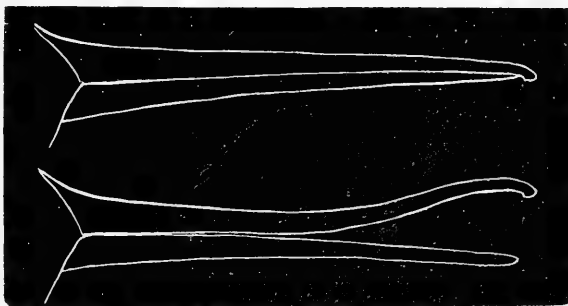


"By a muscular movement of the back part of the jaw-machine the quadrate bone *a* and the palatine bone *b* are pressed upwards and forwards; this pressure acts upon the maxilla *c* which is at first three-cornered, stiff and immovable, but about the middle of the beak becomes flat, thin and flexible. Now as the intermediate premaxilla *e* which forms the back of the beak, is stiff and inflexible to beyond the middle of the beak and only becomes flat, thin and thereby elastic towards the point, the flexibility of the back of the beak only begins at *f*. As the maxilla *c* is joined to the point of the beak from below and at the back, at a movement of the former forwards, the lower can only be displaced upwards, as it cannot lengthen itself. In this bending upwards the elastic front part of the upper jawbone *g-h* also takes part as may be seen in the lower figure, and the whole displacement would not be possible if the descending (maxillary) process of the nasal *i* were not capable of flexion near its upper and lower point of contact. In the chapter on the nourishment of the woodcock we shall go back to the functions of its curiously formed beak. For the moment we shall only mention the useful boney parts of both jaws. Upon examination with a magnifying glass we discover in them a quantity of strangely regularly arranged generally six cornered, bone cells which serve as a basis for the delicate nerves of touch. The accompanying cut gives, slightly enlarged, a picture of this cell-net in the upper beak."



Referring to the flexibility of the Woodcock's bill I find Mr. Stevenson in his *Birds of Norfolk*, 1870, vol. II, says:—"Mr. F. Norgate, of Sparman, on one occasion having slightly winged a woodcock took it home alive, and he assures me that the flexibility of the upper mandible was so great that it resembled more the writhings of a worm than a beak and from the slight sketch, with which he furnished me at the time, its upward curling is suggestive of that most sensitive organ of touch, the proboscis of an elephant." Probably, the most recent and interesting account of this extraordinary flexibility of the bill in some members of the Limicolæ, is that of Mr. V. C. Wynne-Edwards, who, in the *Auk*, for October, 1932, records his experience while watching a Marbled Godwit (*Limosa fedoa*) near Mont-real, as follows:—"Whilst under observation the bird was standing on the river shore and from time to time snapped its beak

open and shut. The movement was so quick that at first it was difficult to follow, but it soon became clear that the upper mandible was flexible, like that of the Woodcock and some other shore-birds. When the beak opened the normal upward curve of the upper mandible was accentuated until the tip pointed for an instant vertically upwards, though the base was still almost horizontal. The bending took place in the distal inch and a half of the beak." We now come to Trumbull's¹⁶ famous paper of 1890 which certainly caused a mild furor when it appeared in the pages of *Forest and Stream* of that year. For weeks afterwards, this paper contained spirited articles on the pros and cons of the author's findings. The Editor, in an editorial notice, went so far as to say that it was perhaps the most important essay on this bird that had ever been published; and he did not recollect that any man had ever before stated that he had seen a woodcock curve up the tip of its upper mandible, as recorded by Mr. Trumbull! The following, is what Trumbull says, in part:—"I had heard from Dr. S. who secured the woodcock for me that he and his friend Mr. B. had seen the bird turn up the end of its upper mandible in a very peculiar and inexplicable manner. I was urged to watch carefully for a repetition of the occurrence. At the time I paid but little attention to the statement, I was watching for so many other events, but while carrying my bird out into the country that last day of its confinement my friend's remark was most vividly recalled. I was holding the bird in my hand with a handkerchief around him, covering all but the bill, when suddenly, as he was making one of his frequent struggles to get away, I saw that the upper mandible was thrown upward as I have represented it in the lower outline of the accompanying woodcut."



¹⁶ *The American Woodcock* by Gurdon Trumbull, *Forest and Stream*, December 11, 1890.

"For an instant, I thought that the bird must have met with an accident in some way, but as I touched the lifted mandible it was lowered to the usual position. Twice more during my walks he threw up the mandible in the same fashion, and each time I held him directly in front of my eyes and studied most carefully the exact curvature. There was no "dilation", nor any change of form other than that which I describe. He once held the bill in this strange position for nearly, if not quite, half a minute. After liberating my captive and reaching home. I immediately procured a woodcock that had been recently killed, and found that I could easily curve its mandible into the precise position into which my live bird could curve his own at will.

"Though my outline was made from the dead woodcock it was drawn while the aspect of the live bird was thoroughly fresh in my mind (within two hours after I had witnessed the occurrence.) For the purpose of comparison I have also drawn the bill as it is commonly seen."

Now, it is far from the wish, or intention of the writer, in any way to belittle, or even suggest that Trumbull's paper is not a most interesting and important one, nevertheless, hard facts remain hard facts, and in view of those already presented, it can surely no longer be claimed, as more than one important text book does, that Trumbull was the discoverer of the flexibility of the upper mandible of the Woodcock's bill. As far back as 1799, this was known to Naumann, as already shown, also to Cumberland in 1805, and to Hoffman in 1867, while the keeping, feeding and watching of the birds in confinement was by no means new, as Bowles in 1775 and others long before him, had watched them in the royal aviary at San Ildefonso in Spain, as well as Montagu in England in 1813, the results of whose observations were much the same as those of Trumbull. What Trumbull's paper really accomplished was more in the light of an interesting debate on the pros and cons of whether the notes of the Woodcock are produced by its wings or its throat. Such well known men as the late Wm. Brewster took part in the controversy, he taking the opposite view to Trumbull, namely, that for the most part the notes or sounds are made by the wings, while Trumbull maintained that they proceeded from the throat. In this connexion, it is a treat to read Brewster's courteous criticism of Trumbull's paper. From the writer's experience with Woodcock, extending over a period of nearly fifty years both in this and the old country, not only while shooting them in the field, but also from

a close study, during the past ten years, of their nesting habits, he has come to the conclusion that the notes are mostly vocal ones. The only noise or sound apparently made by the wings is a light fanning when the bird flushes or rises some way off, which of course becomes more pronounced when the bird is flushed close at hand, as when one nearly treads upon it. On many occasions, especially in April and May, a bird has risen some way off, flopping down again as it were just over the adjacent bushes, with scarcely any noise whatever, just a gentle fanning from the wings. On following it up the same thing has occurred again, but on again flushing it for the third time the bird has given vent to a series of twittering notes, in addition to the fanning or, shall we say, whistling noise from the wings. If the twittering notes are not vocal, but wing notes, why were they not given every time the bird arose? Again, on several occasions I have flushed a bird almost at my feet, where escape was impossible except by its rising almost perpendicularly in an endeavour to top the surrounding trees. At such times the fanning noise is much increased, in fact to quite a whistling noise, owing to the more rapid vibration of the wings, made necessary by the almost perpendicular rise, while the twittering notes have also been rendered more rapidly, owing to the bird's fright until at times they have resulted in an explosive squeak, or squeal, somewhat similar to the *scaipe*, *scaipe*, of the Snipe, as it rises almost under foot. No one, I believe, has suggested that the Snipe's note is caused by its wings, so why assume that the Woodcock's twittering notes, finally ending in a scream of alarm, are made by its wings?

Only last spring (1932) I accidentally flushed a Woodcock off her nest, so well was it concealed under the drooping bough of a small balsam fir. On this occasion she not only gave vent to this same squeal of alarm, but voided at the same time, in her evident fright, which no doubt was the cause of her abandoning the eggs. However, why worry, for, as long as there are Woodcocks, there will always be naturalists and sportsmen disagreeing on this much vexed question I imagine, although, probably the best, and most happy solution to the whole controversy, would be to consider the *peent* notes made by the bird when on the ground, just previous to rising for the sky dance, also the soft liquid notes as of dropping water, rendered during the descent, as the bird volplanes to earth and its mate, as well as the explosive squeal note of alarm, to be all vocal ones as they surely must be, and only the fanning, whistling or

twittering notes, as they have been variously described, and which are usually heard as the bird rises off the ground, to be produced by the wings the hatchet might be buried once and for all, as when doctors disagree, who shall decide?

A break of thirteen years now occurs, before Dr. R. W. Shufeldt's¹⁷, famous paper on the *Osteology of the Limicolæ* was published in 1903, a paper which no doubt, even at the present day,

can still be described as probably the most extensive contribution to the osteology and taxonomy of the Limicolæ, that has appeared from the pen of any writer. There are no less than 27 figures of the anatomy of this "plover-snipe" group, of which the one here reproduced is No. 13, representing the skulls of the American Woodcock, *Philohela minor* (E), Wilson's snipe, *Gallinago delicata* (F), and the Black-necked Stilt, *Himantopus mexicanus* (G).

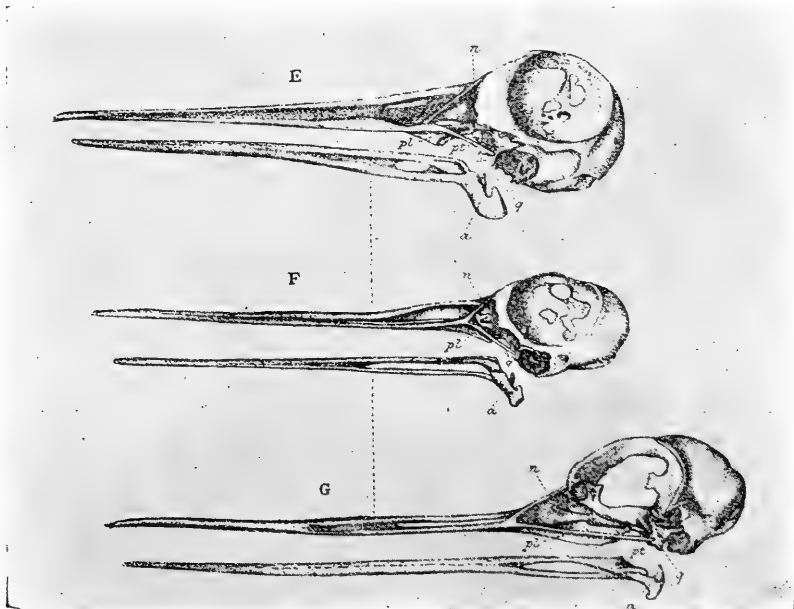


FIG. 13. Left lateral views, natural size, of skulls of *Philohela minor* (E), *Gallinago wilsoni* (F), and *Himantopus mexicanus*, (G). n, nasal; pl, palatine; pt, pterygoid; q, quadrate, and a, articular.

Apparently, there is no specific reference to the peculiar position of the ear, nor yet, to the flutings on the sternum of the Woodcock, matters which will be referred to later in their respective order, as discovered. What is said of the sternum (in part) is as follows:—"Indeed in so far as shape is concerned, irrespective of mere size, this bone is of a very uniform pattern throughout the majority of our typical Limicolæ—the Woodcock (*Philohela*) and Wilson's Snipe (*Gallinago*) being conspicuous departures therefrom."

Of the skulls (also in part) Dr. Shufeldt says:—"Although essentially limicoline in their general character, the skulls of *Scolopax rusticola*, *Philohela minor* and *Gallinago delicata*, and no doubt others of those genera, depart in some very striking particulars from the limicoline skulls we have thus far considered in this paper. Except in point of size there is scarcely any difference between the skulls of the European and American Woodcocks, the former being about one fourth larger."

In the Synopsis of the principal osteological characters of the Limicolæ I will just quote a few remarks of Dr. Shufeldt's having particular reference to the Woodcock:

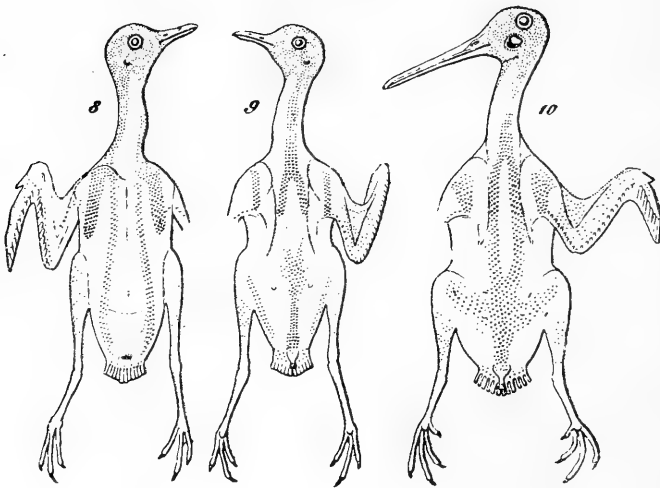
¹⁷ *Osteology of the Limicolæ*, by Dr. R. W. Shufeldt, *Annals of the Carnegie Museum*. Vol. II. 1903, No. 3, pp. 15-70.

5. The vomer may be small and spiculiform (*Philohela*), or long and lamelliform.
9. The angle of the mandible may be either a sharp, recurved process or it may be lamelliform as in *Haematopus*. It may have its articular ends bent downwards as in Woodcocks and *Gallinago*.
10. The sternum may have two pairs of xiphoid-al notches (Plovers and others), or a single pair (*Actitis*, *Rhyacophilus*, Jacanas, Woodcocks and *Gallinago*).

A break of only a very few years now occurs before the next important discovery was made, that of Chas. Whymper, in 1907, who found that the ear of the Woodcock was placed in front of, instead of behind, the eye, as in other birds. The notice of this appeared in volume 1, of *British Birds*, 1907, and is as follows:—"On my shooting a woodcock last December (1906), the man, when he picked it up, said, "You have shot him right through the head": and, on look-

ing, there was indeed a hole, but not a shot hole—it was the orifice of the ear! And I was astonished to find it placed in front of the eye—not behind it, as is the case with practically every other vertebrate. Consulting my bird books, I found no reference in any one of them to this remarkable fact, and from conversation with many of the leading ornithologists I gather it is not generally, if at all, known. My friend, Mr. W. P. Pycraft, has the subject now in hand, and he proposes to deal at length with it in the pages of *British Birds* at no distant date. Chas. Whymper, May 14, 1907." To the above notice came the following reply, also, in *British Birds*, "If Mr. Whymper will consult the edition of Nitzsch's *Pterylography*, published by the Ray Society in 1867, edited by Dr. Sclater, he will find in Plate IX, fig. 10, the external orifice of the ear correctly placed below and in front of the orbit. P. Chalmers Mitchell."

Limicolae.



On referring to Nitzsch's *Pterylographie*, the present writer finds that even in its feather tracts, the Woodcock differs from other species of the *Scolopacinae* as will be seen in the above reproduction of figure 10, and following description (in part) translated from the German by Dr. Sclater the editor of the above work:—"In the true Snipes alone (Plate IX, fig 10) I have seen it [*i.e.* the lumbar tract] united to the hinder part of the dorsal tract; this is due to its remarkably oblique position. One species of this genus (*S. rusticola*) presents a difference in that

the hinder part of the dorsal tract is completely coalescent with the anterior part, which is distinguished as a separate portion only by its rather strong plumage; the other species of *Scolopax*, on the contrary, follow the ordinary type, although the division of the hinder part is somewhat longer than in *Charadrius*, figure 9."

To Dr. Mitchell's letter the Editors of *British Birds* replied as follows:—"Since receiving Dr. Chalmers Mitchell's letter, we have again examined Nitzsch's figure, and agree that it may be described as an approximately accurate figure.

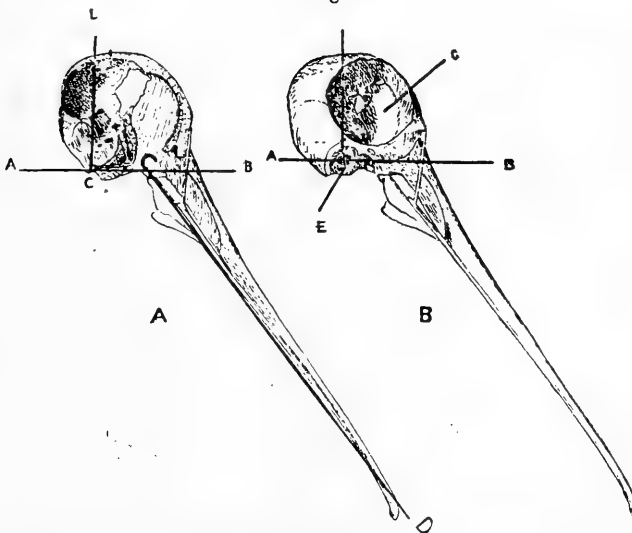
It is of course quite possible that many ornithologists may have known of this curious feature, but the credit of bringing the matter into general notice belongs to Mr. Whymper." In this connexion, the present writer would like to point out that the late Dr. Elliott Coues in his *Key to North American Birds* published in 1872 refers to the position of the ear in the following words; "In Woodcocks (*Scolopax*, *Neoscolopax*, and *Philohela*) and true Snipe (*Gallinago*) the ear appears below and not behind the eye, which is placed far back and high up; and if the brain be examined, it will be found curiously tilted over so that its anatomical base looks forward." As regards the reference to Mr. Pycraft, in Mr. Whymper's letter, that gentleman eventually published a paper on the position of the ear of the Woodcock¹⁸, not, however, in *British Birds*, but in the *Field* of May 18, 1907, and *Ibis* for October, 1908, accompanied in the latter periodical by five text figures, of which No. 4, here reproduced, is perhaps the most important, since it supports the author's contention that it is not the beak which is abnormally situated, but the

aperture of the ear, this being in distinct opposition to the views of Prof. D'Arcy Thompson, as expressed in an article in the *Field*, November 16, 1907, vol. 110, p. 887.

Briefly, in part, this is what Mr. Pycraft says:- "It has long been known that in the matter of the external aperture of the ear, taken in its relation to the eye, the Snipe (*Gallinago*) differs markedly from all other birds, but the still more abnormal position of this aperture in the Woodcock escaped notice, because it was assumed that what obtained in the Snipe would naturally obtain also in the Woodcock. Thus, then, if the head of a recently-killed Woodcock be examined, the aperture of the ear will appear in a quite abnormal position, for if a line be drawn at right angles to the long axis of the beak, and passing through the periphery of the anterior margin of the exposed surface of the eye, the aperture of the ear will be found lying in front of this line. In other words, when examined in relation to the beak as just described, the aperture of the ear appears to lie in front of, and below, the level of the eye. A comparison of text-figures 4 (A & B) will make this clear.

¹⁸ On the position of the Ear in the Woodcock (*Scolopax rusticula*) by W. P. Pycraft: *The Ibis*, Oct. 1908, pp 551-558.

Text-fig. 4.



- A. Inner view of the left half of the skull of a Woodcock (*Scolopax rusticula*), shewing the brain-case and the relation thereof to the basicranial axis.

The line A-B=a line drawn through the basicranial axis; the line C-D=a line drawn from the occipital condyle through the brain-case, at right angles to the basicranial axis. This figure is not quite accurately drawn, hence this line passes too far to the left; its true position is indicated by the short line to the right of C-D.

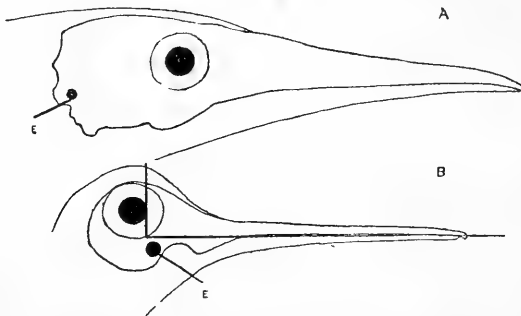
- B. Outer view of the same skull, shewing the relation of the external aperture of the ear (E) to the basicranial axis (A-B). O. Orbit.

"And now as to the relation of the beak to the long axis of the cranium. In the more primitive skulls—as for example, in the Gannet and Guillemot—the basicranial axis and the long axis of the beak run parallel one to another, while in the Woodcock the long axis of the beak runs almost at right angles to the basicranial axis. By the shortening of this axis the cranium has become tilted backwards, or, more correctly, as the base of the cranium shortened the foramen magnum was brought nearer to the base of the beak thereby throwing the floor of the metencephalic fossa into a vertical position, and bringing the cerebellar fossa into such a position that

it now lies beneath, instead of behind the cerebral fossa—a truly remarkable case of shifting parts.

"Prof. D'Arcy Thompson, in the article to which reference has already been made, remarks: "The Woodcock's ear is very little, if at all, out of its normal place when looked at in relation to the base, or hinder part of the skull. In other words, it is not the Woodcock's ear, but its bill that is abnormally situated." But the weight of evidence, it seems to me, points entirely to an opposite conclusion. The cranium of the Woodcock, when compared with that of a Gannet, for example, has obviously undergone very

Text-fig. 5.



- A. Diagrammatic side view of the head of a Gannet, shewing the outline of the skull and the position of the external aperture of the ear (E) and eye.
B. Similar view of the head of a Woodcock, to shew the forward position of the ear.

profound modifications, and these have come about by what may be described as a process of telescoping the basis cranii; thereby the brain-cavity has completely changed its shape, and the aperture of the ear with the rest of the hinder portion of the cranium has been swung downwards and forwards towards the base of the beak, the long axis of which virtually retains its primitive angle. This being so, and the evidence is incontrovertible, it is not the beak which is abnormally situated but the aperture of the ear, as I originally contended.

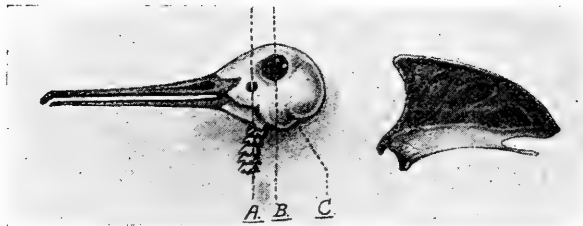
"Furthermore, let me repeat once more, the ear of the Woodcock is not "just under the eye" as in the Snipe, as was contended by a writer in the *Field* for September 7, 1907, (Vol. 110, p. 479.)."

After Whymper's discovery, came the still more extraordinary one of Abel Chapman¹⁰, who, in 1920, found, not only that the position of the

spinal vertebræ of the Woodcock was different from their position in other birds, but also that the sternum had flutings. The notice of this discovery is as follows:—

"The abnormal position of the ear was first pointed out so recently as 1907 by Mr. Chas. Whymper, the well-known artist; but the second peculiarity remained undetected until 1920, and the manner of its discovery came about thus. Early in April we had noticed a woodcock incubating her four eggs in Houxty wood; and on the 14th I took Mr. A. L. Butler of Khartoum to view a sight which can never be seen in the Sudan. Alas! Some vermin had forestalled us. The eggs—in act of "chipping"—lay scattered, cold, deserted; and all that remained of the parent was a bunch of breast-feathers and quills, together with the naked skull, lying a dozen yards away. It was upon examining the latter that the extraordinary position of the vertebral column struck us both; but being no anatomist, I must leave the sketch to tell the rest of the story.

¹⁰ *The Borders and Beyond*, by Abel Chapman, 1924, pp. 379-381.



WOODCOCK—SKULL

Showing both the ear and the articulation of the spinal vertebræ on line A., in front of the eye, B. C. is the point whence the vertebræ would normally spring.

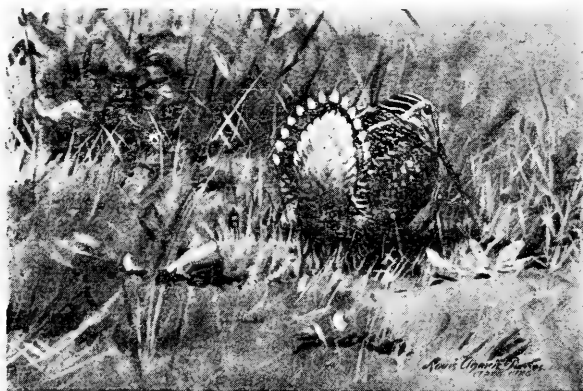
"The skull itself, together with a sketch and a few words of description, I sent to the *Field*, in which paper the note appeared a week or two later, the Editor confirming its accuracy. The second sketch shows the curious "flutings", or corrugations, on the sternum of a woodcock. What purpose (if any) they serve is obscure."

It might have been supposed that with Abel Chapman's discovery the climax had been reached, and that there was nothing further to be said, but can "finis" ever be written to the history of this most extraordinary bird? As recently as 1926 we have Dr. Cushman Murphy's²⁰, interesting account of a "strutting" Woodcock, which reads, in part, as follows:

"The strutting of Woodcocks with spread tails has been mentioned by several observers, but I find no reference to the use of the tail as a lure to lead interlopers from the nest. This however, seems to have been the clear intention of an incubating bird observed at Bronxville, N.Y., on various dates between April 10, 1926, and the hatching of the four eggs on April 20. She

(assuming that it was the female) would allow us to come within a few feet before leaving her well concealed position. Then she would spring from the nest, pitch on the ground close by, and, standing with the tail toward us, would raise and spread it so as to show to full advantage the double row of glistening white spots at the ends of the rectrices, and under coverts. Next, flashing this striking banner slowly, she would move off among the trees in the attitude of a strutting turkey cock, stopping when we refused to follow, and then tripping ahead for a few steps, all the while bleating softly. The effect was astonishing; the ordinary low visibility of a woodcock against the forest floor no longer held, for the spotted fan of the tail had become a most conspicuous and arresting mark. We were unsuccessful in trying to photograph the display but Mr. Fuertes most faithfully followed descriptions in making the charming water-colour which is here reproduced in black and white."

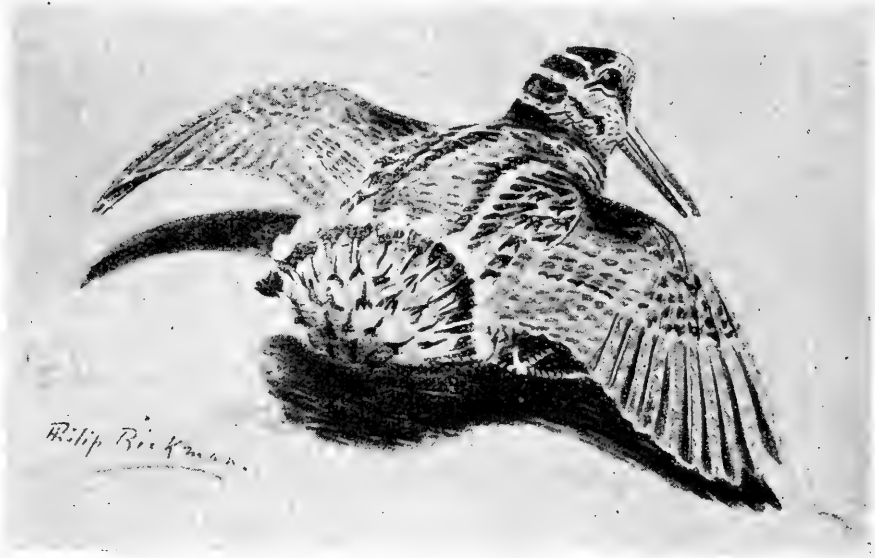
²⁰ Nest-protecting Display of the Woodcock, by Robert Cushman Murphy, *Bird-Lore*, July-Aug., 1926.



A STRUTTING WOODCOCK
From a painting by Louis Agassiz Fuertes

With regard to the spreading of the tail, the present writer has seen Woodcocks do this on several occasions while fluttering along the ground with wings fully spread after having been flushed off their eggs or young. Mr. Philip Rickman²¹, depicts this attitude to perfection in the following sketch, which although

that of a much frightened young bird does equally well as representing the general attitude adopted by the adults to draw attention to themselves when danger threatens the young. Of this young bird Mr. Rickman says; "In 1929 I found a young woodcock nearly full grown sunning itself by a rhododendron bush at the edge of a



birch wood. On my approach the bird crouched, and on being touched, it flew about fifteen feet, oddly enough not into the covert but parallel to it. I then picked the bird up to examine closely the colour of its beak and feet at this age. These were much like those of an adult, but paler. On placing it on the ground, it assumed the attitude depicted in the sketch, with its tail fully spread over its back. It will be observed that the tail feathers are not more than half out of the quills. On touching the bird again, it ran along waving its wings and squeaking loudly, still carrying its tail over its back. Its attitude and manner of waving its wings to help its progress reminded me very forcibly of a pigeon squab's progress while on the floor of a loft when running to meet its parent, or if trying to evade capture. Wounded woodcock will flirt out their tails and raise them in the manner described. I have heard of their doing this when attacked by a Hawk."

In addition to this strutting and fluttering along the ground of the Woodcock, mention must be made of their peculiar love-song and flight, and occasional perching in trees like the snipe.

As regards the first named, it may be interesting to note that the love-song and flight of the European bird commonly known as "roding" or "roading" is very different from that of the American bird, consisting of a comparatively slow straight flight down certain favoured glades in the woods, the birds at the same time uttering two kinds of notes, a croak often repeated thrice, or else a chirping screech, which has been likened to *chizzie*. Not the least remarkable part of this strange performance is the routine which is observed. At dawn and dusk alike the same ground is traversed, almost, we might say rhythmically. Commonly the path traversed forms a rough triangle, the sides of which may be a quarter of a mile or more in length. In former times advantage was taken of this habit to catch the simple performer in nets called "cockshuts", which were hung between trees, across open

²¹ A *Bird-Painter's Sketch Book*, by Philip Rickman, 1931, pp. 100-01.

glades or rides in the wood. This practice of netting, however, was not alone employed for the capture of love-sick birds, but was even more extensively employed during the winter months in taking birds as they left the shelter of the woods for their feeding-grounds, for these birds are curiously methodical in their habits through-

out the year, leaving and entering the woods by regular routes. That this practice is one of hoary antiquity can be judged from the following picture, which represents a woodcut executed by Tempesta prior to the year 1639, intended to depict the two methods of catching Woodcock then most widely in vogue.



The foreground shows a series of snares or springs set to catch the birds, while the background displays a "cockshott net", as manipulated by the attendant fowlers, the reproduction being from a print in the British Museum. This practice of netting Woodcock was so general as to suggest the employment of the phrase "cock-shut time" as a synonym for twilight. Shakespeare, for instance, in *King Richard II*, writes:

*"Thomas the Earl of Surrey and himself,
Much about cockshut time, went
through the army".*

and Ben Johnson has;

*"Mistress, this is only spite—
For you would not yesternight
Kiss him in the cockshut light."*

In the days when these "glade nets" and snares were extensively used there is no question that this species was extremely abundant; and of this we have also additional evidence from the small sums which they formerly fetched in the market allowing even for the difference in the present value of money, eight Woodcock in the Duke of Buckingham's *Household Book*, 1507, costing eightpence, whilst in the *L'Estrange Accounts*, also, there is an entry in the year 1520, of three Woodcock purchased in Snettisham market for sixpence; and in 1522 of six

purchased from John Long of Ingoldisthorpe for tenpence. Their excellence as a table delicacy was as fully appreciated then as now, as will be gathered from the following passage in Willughby's *Ornithology*, published by Ray (1678):—"The flesh of this bird for the delicacy of its taste is in high esteem"; and with special reference to the excellence of the leg the author quotes the old "English Rhythm"—

*"If the partridge had the woodcock's thigh,
T'would be the best bird that ever did fly".*

In days gone by large "bags" of Woodcock were often made, the record one I believe, being made at Ashford, Lord Ardilaun's estate in County Galway, when a party of eight guns killed 508 'cock in one day in January 1895. From these same coverts 106 'cock were killed in one day in 1878; in 1879 two days yielded bags of 117 and 115 birds respectively, in 1880 a head of 165 was bagged in one day, while in 1899 a day's bag amounted to 168 head. These, of course, are highly exceptional figures, even for Ireland. A century ago, in County Cavan, Lord Clement killed 102 'cock to his own gun, a flint-lock, in a single day. This was done for a wager, a wager of three hundred guineas that he would account for fifty couple of Woodcock between dawn and dark. Good bags also have been made in Norfolk, the best English

county for Woodcock, where on Lord Hasting's estate at Melton Constable, over fifty couple of 'cock have been killed in the day. As an illustration of the one time abundance of these birds in North America might be mentioned the case of Mr. James J. Pringle who gives a record of fifty-five Woodcock killed from 9 a.m. to 2 p.m. in Louisiana to his own gun.

As to the song and sky dance of the American bird, no more inspiring spectacle can be witnessed, as I have recorded elsewhere²², than this love song and flight of the Woodcock when, in the dusk of evening, in ever diminishing spirals, the bird ascends to a height of some two or three hundred feet, at first with vibrant whistling sound or notes, changing later to twittering ones, before reaching the summit of its flight, and yet again to those clear liquid gushing notes, the love song proper, as the bird volplanes to earth in great sweeps, dropping suddenly at the last, when all sound ceases, usually to within a few yards of the place from which it had risen, to commence once again, those strange nasal *peent* notes, always the prelude to another aerial flight. As to these strange notes I have heard them delivered as many as 154 times (possibly a record) before the bird arose from the ground as already recorded in the above paper.

Like the snipe (*Capella gallinago*). Green Sandpiper (*Tringa ocropus*), Black-tailed Godwit (*Limosa limosa*). Upland Plover (*Bartramia longicauda*), and Greenshank (*Glottis nebularia*), the Woodcock has been seen (but only on very rare occasions) both in this and the old country to perch in trees, a statement which like many others whenever made regarding this bird, has for some reason or other always been received with the greatest incredulity, so much so that Mr. Walter H. Rich when making the statement in his *Feathered Game of the Northeast*²³, that he had twice wit-

nessed the event, says he did so with fear and trembling, which remark I suppose ought to be applicable in my case also, since I am about to record the fact of having myself seen a bird perched in a small poplar tree on the borders of a little wood near St Hubert, P.Q., on June 24 of the present year (1933).

Albino and pied varieties of the Woodcock have frequently been met with. As regards size and weight, the European bird is somewhat larger than his American relative, the female of both being a trifle larger than the male, the average weight of the European bird being about 12 oz.; that of the American from 6 oz. to 8 oz. The emargination of the first three primaries of the latter bird, a characteristic not present in any other similar species, is well shown in the following sketch:

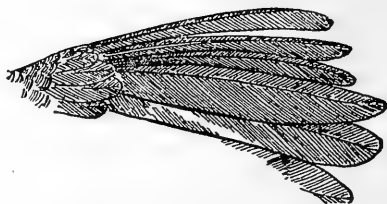


Figure 158
Emarginate primaries of American
Woodcock; scale, $\frac{1}{2}$.

which is taken from Mr. P. A. Taverner's *Birds of Western Canada*²⁴, whilst the strongly marked longitudinal stripes down the back, and absence of barring on the breast and flanks, can be seen in the present illustration accompanying Mr. Pycraft's article entitled *Concerning Woodcocks* which appeared in the *Illustrated London News* of February 11, 1933.

²² *The Love Song and Flight of the Woodcock (Philohela minor)*, by Henry Mousley, *Can. Field-Nat.* 41:184-85, 1927.

²³ *Feathered Game of the Northeast*, by Walter H. Rich, 1907, pp. 124-25.

²⁴ National Museum, Ottawa, Bull. No. 41, Biol. Ser. No. 10, Sept 15th, 1926.



FIG. 1. THE NORTH AMERICAN WOODCOCK: A SMALLER SPECIES THAN OUR BIRD, AND PLACED IN A GENUS BY ITSELF ON ACCOUNT OF THE ABSENCE OF BARRING ON THE BREAST AND FLANKS.

The woodcock of North America (*Philohela minor*) has much more strongly marked longitudinal stripes down the back than the British bird. During flight it can at will produce a whistling sound by means of the curiously attenuated and stiffened outer primaries.

In this same article, Mr. Pycraft refers to the pin feather, and noticeable variation in the colour of the first primary of the European bird not being indicative of sex, as some suppose, but

of age, the young birds having the outer web of this feather variegated, the old one plain, as shown in the following illustration.

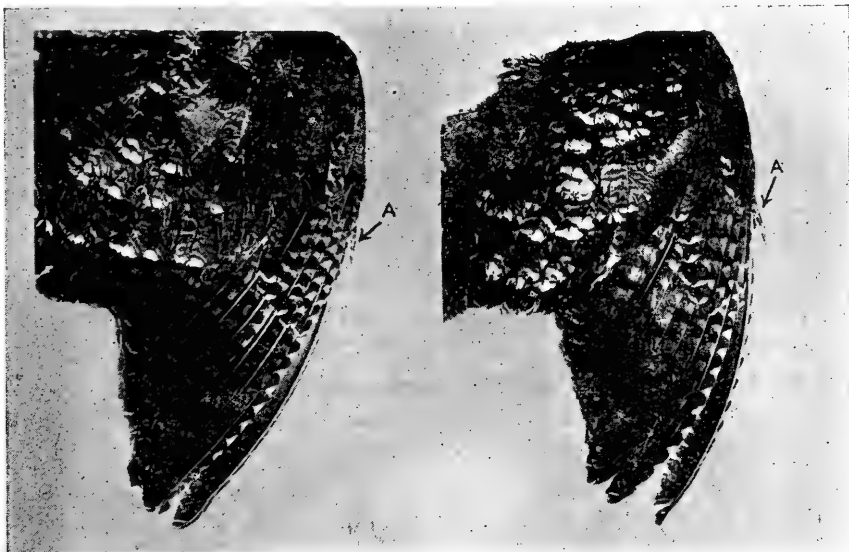


FIG. 2. THE WING OF A WOODCOCK; SHOWING THE "PIN-FEATHER" (A), WHICH IS THE VESTIGIAL REMNANT OF THE ELEVENTH PRIMARY: PROBABLY THE WING OF A FULLY ADULT BIRD, SINCE THE OUTER MARGIN OF THE TENTH PRIMARY IS WITHOUT MARKINGS.

FIG. 3. THE WING OF A BIRD PRESUMABLY YOUNGER THAN IN FIG. 2; SHOWING THE "PIN-FEATHER" (A) AND A NOTCHED PATTERN ALONG THE OUTER WEB OF THE TENTH PRIMARY—A PATTERN NOT, AS HAS BEEN STATED, PECULIAR TO THE FEMALE.

These photographs show the tiny "pin-feather" of a woodcock, which answers to the eleventh primary reduced to the condition of a vestige—a condition found, in varying degrees, in most of the plover tribe. They also show the absence (left) and the presence (right) of markings along the outer margin of the tenth primary—a distinction that does not differentiate the sexes, as has been claimed.

In the same month and year (1933) that Mr. Pycraft's article appeared in the *Illustrated London News*, there came out also in Germany an article by Dominik von Kripp entitled *Der Ober-*

schnabel-Mechanismus der Vögel with 45 illustrations in the text²⁵, one of which, here reproduced, represents the difference in the general make up of the skull of a Snipe from that of a

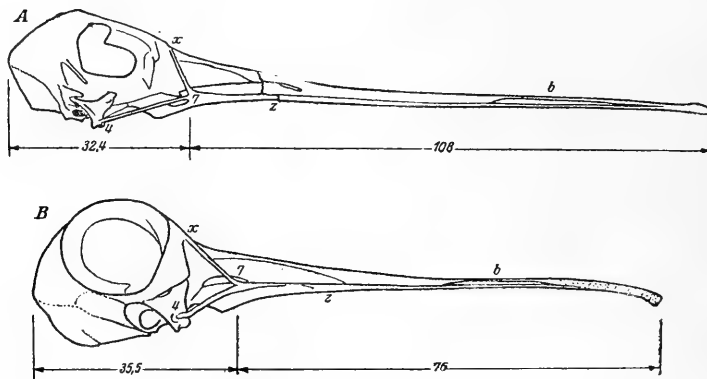


Abb. 7.

A. Bickasine, Gallinago gallinago. (Beachte die typische Sondenform des Schnabels. B. Waldschnepp, Scolopax rusticola. b = Biegungswelle, 47 = lateraler ventraler, 72 = lateraler dorsaler, 74 = medialer Schenkel des Spannaparates. Maße in Millimetern.

Woodcock. It is from this drawing, combined with numerous diagrams, that Kripp contends that the Woodcock's bill is actuated principally through the jugal arch, and not through the pterygoid, whereas, in the Snipe, the pressure is probably distributed between them; this in direct opposition to the views of Marinelli and Schumacher who contend that the principal pressure is exerted through the pterygoid. To the present writer, it seems logical enough that the Snipe, working as a rule in much softer ground than the Woodcock, requires less pressure to open its mandibles than does the Woodcock, whose feeding grounds are usually in drier situations, hence the special bending downwards and forwards of the hinder portion of the cranium of the Woodcock, thereby giving the bird the means of exerting a much greater pressure, one would imagine, than can be exerted by the Snipe owing to the very different construction of its skull. At least, this in the main appears to be Kripp's contention, which certainly seems to be borne out, one would think, even by a superficial glance at the drawing, the much shorter zygomatic arch (lateral ventraler 47) of the Woodcock, apparently, requiring no further assistance, whereas, the much longer zygomatic arch (lateral ventraler 47) of the Snipe would seem to need some further assistance, i.e. through the medium of the pterygoid, to enable the bird at times to open its mandibles when immersed in the mud. Interesting papers on the flexibility of the upper mandible of the Snipe, etc. will be found in the *'Ibis'* of 1893,

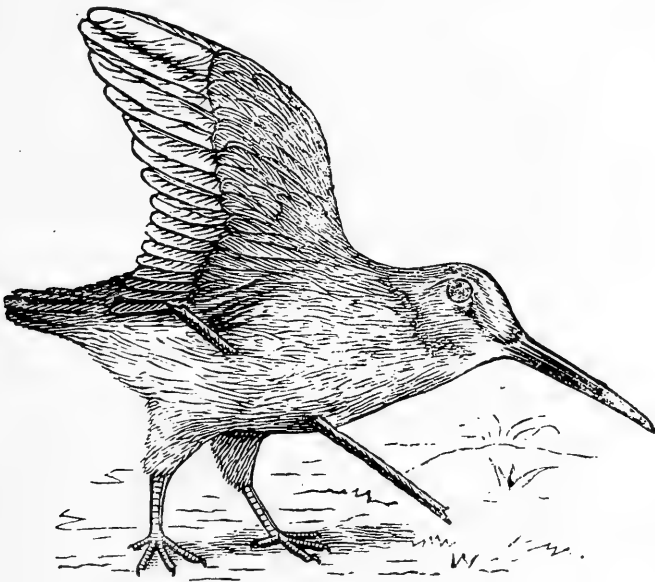
p. 361 and p. 563, also for 1907 p. 614; *British Birds*, vol. 2 p. 249, and Bronn's, *Thier-Reich's*, 1891, Taf. IV, fig. 1.

Nicknames amongst birds are not unknown, the diminutive Golden-crested Wren (*Regulus regulus*) which visits the east coast of England in enormous flocks, apparently emigrants from Scandinavia, and which often perish by hundreds while crossing the North Sea, is well known to the fishermen as "Woodcock's Pilots", from their generally preceding by a few days the advent of those regular immigrants. For a similar reason the Short-eared Owl (*Asio flammeus*) is known to English sportsmen as the "Woodcock Owl", for though a good many are bred in Great Britain, the majority arrive in autumn from Scandinavia, just about the time that the immigration of Woodcock occurs. At Loftus and Staithes in Yorkshire, the Hooded Crow (*Corvus cornix*) is also known by the vernacular name of the "Woodcock Crow", but for what reason I am unable to say, although it is clear that the term "Woodcock Snipe", as applied to the Great Snipe (*Capella media*) in some parts of the United Kingdom, has reference to its superior size, as compared with that of its near relative the Common Snipe (*Capella gallinago*). In his *Travels or Observations in Barbary*, 1738, p. 253, Dr. Shaw tells us that the Africans call the Woodcock *Hammar el Hadjel*, the Ass of the Partridges, merely, I imagine, because like the Bar-

²⁵ Gegenbaurs *Morphologisches Jahrbuch*, Leipzig, February, 1933, pp. 469-544.

bary Partridge and a certain Quail, the Woodcock is only a bird of passage in Africa. In America the Pileated Woodpecker (*Ceophloeus pileatus*) is sometimes called Log-cock or Cock of the Woods, vernacular names, which often being corrupted into Woodcock, have been a source of much confusion and misunderstanding which was well exemplified in my own case when I first came to reside in this country.

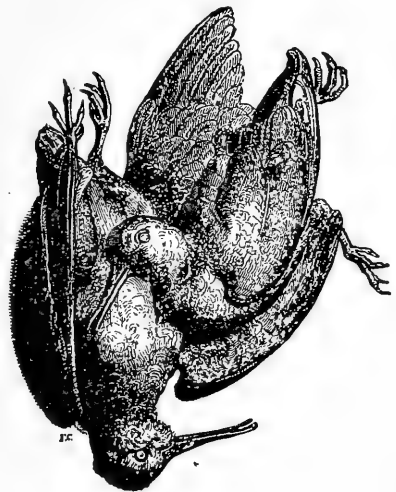
It is seldom one comes across instances of birds which, having at one time or another been impaled by a twig or other similar substance, yet live to later on tell the tale of their misfortune. Such, however, was the case with the present Woodcock drawn by Mr. Merrill and here reproduced from an illustration appearing in the *Ornithologist and Oölogist* of March, 1881. The



bird, it appears, was shot near Bangor, Maine, and sent in the flesh on October 9, 1880 to Mr. Merrill, the taxidermist of that town, who mounted it with the stick in its breast just as it was shot. The flesh was but little cut and had entirely healed, as also had the skin, so that the stick was fastened into the wound. The growth of the bird had apparently been stunted by the presence of the stick which was a perfectly straight piece of stalk of the Golden-rod or some growth of a like nature, which had evidently pierced the breast of the bird when alighting.

No account of the Woodcock, or at least of the European bird, would be complete without a reference to the feat of the famous sculptor Sir Francis Chantrey, who, while out shooting with Mr. Coke (afterwards Earl of Leicester) at Holkham, Norfolk, on November 20, 1829, obtained two Woodcock at one shot, afterwards immortalizing them in a beautiful marble tablet

which he carved and presented to his host, and which is now in the library at Holkham, and is here reproduced.



The occurrence from its singularity and the artistic celebrity of the performer (although the feat has since been accomplished by other sportsmen), has been the subject of no less than 179 poetical effusions, which have been collected in a small volume by Mr. J. P. Muirhead, entitled *Winged Words on Chantrey's Woodcocks*, of which the following verse and couplet are worthy of record:—

"Life in death, a mystic lot,
Dealt thou to the winged band:
Death,—from thine unerring shot,
Life,—from thine undying hand."

The Bishop of Oxford.

and

"Driven from the north where winter
starved them,
Chantrey first shot, and then he carved
them"

The late Mr. Hudson Gurney.

In conclusion, to all those kind friends who have assisted me in any way, with translations, or otherwise, and especially to Dr. Lomer who, in more ways than one, has made this compilation a much easier task than it would otherwise have been, the best thanks of the author are due, and hereby tendered.

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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No. 2

THE NEST OF THE GREAT CRESTED FLYCATCHER

By CHARLES MACNAMARA

DIFFERING from the well-behaved child, the Great Crested Flycatcher (*Myiarchus crinitus*) is more, often heard than seen. His loud ringing notes are familiar and stirring sounds in our thick-leaved summer woods; but mostly he keeps close among the trees, and seldom shows in the open like his cousin the Kingbird [*Tyrannus tyrannus*], and never frequents dwellings like his other cousin, the almost domestic Phoebe [*Sayornis phoebe*]. When you do get a look at him, you see a bird a little smaller than a Robin [*Turdus migratorius*], with olive-brown back, grey breast and sulphur-yellow underparts. The ruffled feathers on his head give him an appearance of permanent surprise.

The bird builds in a hole in a tree, usually an abandoned woodpecker hole. It pads the bottom of the cavity with grass, fine roots, hair and feathers—quite an ordinary procedure among birds. But the Crested Flycatcher's nest is remarkable in almost invariably including one or more cast snake skins in its material. Occasionally a nest is found consisting of nothing but snake skins. Snakes crawl under logs and stones to shed their skins, and the cast skins are rarely seen by chance. But as every field-naturalist knows, you find what you look for, and do not so often come on things by chance. The Crested Flycatcher knows where to look, and discovers his snake skins even, one writer says, in localities where there were not supposed to be any snakes.

An early, if not the earliest, reference to the habit is in Alexander Wilson's (1766-1813) classical work, *American Ornithology*, which was published between 1808 and 1813.

"One of the nests now before me is formed of loose hay, feathers of the Guinea fowl, hog's bristles, pieces of cast snake skins and dog's hair. Snake skins with these birds appear to be an indispensable article, for I have never yet found one of his nests without this material forming part of it. Whether he surrounds his nest with this

by way of *terrorem* to prevent other birds or animals from entering, or whether it be that he finds its silky softness suitable for his young, is uncertain; the fact, however, is notorious."

Without comment, Audubon mentions the "exuviae of snakes" as one of the components of the nest, and every writer since remarks the curious habit, being unanimous in saying that a nest without a snake skin is a rarity. John Burroughs say that in the absence of a snake skin he has found an onion skin and shad scales in the nest. Another author found a piece of tough tissue paper instead of a snake skin.

Many are the speculations as to the reason for the snake skin. As we have seen, Wilson, the cautious Scot, leaves the question undecided. Audubon seems to avoid it. Wintle, quoted in Macoun's *Catalogue of Canadian Birds*, surmises that the skin is to frighten off squirrels. Forbush objects to this that the skins are "often bestowed so as to be invisible from the entrance, and it is hardly possible that a dried snake skin would frighten any animal, unless indeed the scent of the snake still lingers about it". The piece of "tough tissue paper" already mentioned rustled when the hand was put into the nest, and its discoverer thought that it was the rustle of the snake skin which "either delighted the bird, or to which it trusts for giving warning of an enemy's approach during the owner's absence—a sort of burglar alarm as it were". Chapman thinks the habit is atavistic. He says that one of the commonest and most generally distributed species of the same genus in South America is known to place snake skins in its nest, and that the Arizona Crested Flycatcher follows the same custom. He suggests that the habit is "an inheritance from a common ancestor and has no connection with the present surroundings, of at least those species living so far from the center of distribution of this tropical genus as our *Myiarchus crinitus*".

Personally I hesitate to express an opinion, as the only Crested Flycatcher's nest I ever examined had no snake skin in it. One hot summer day Ligouri Gormley and I noticed a pair of Great Crested Flycatchers perched on branches overhanging a small stream that flows into the Ottawa River, near Arnprior. Although we did not see them enter, we guessed that their nest was in the hollow of a decrepit ash on the bank nearby, and knowing the story of the snake skin, we were curious to see if this nest contained one. The ash leaned out over the water and could not easily be reached at this time, so we decided to postpone investigation until winter, when we could work from the ice.

Thus one morning in the middle of the following March, carrying axe and camera, we set out over the crust that covered the three feet of snow still on the ground. In general the crust was strong enough to bear without snowshoes, but once or twice we broke through, almost waist deep, with startling suddenness. The temperature was moderate for a winter day, 12 deg. F., but when we reached the hollow ash we found half a gale of wind, blowing up the creek from the wide expanse of the ice-covered Ottawa, and my hands, necessarily bared to manipulate the camera, ached acutely before I finished photographing the proceedings.

The tree was photographed as it stood, and then Ligouri was pictured in the act of chopping it down. It soon bowed beneath his sturdy stroke, and crashed to the ice. Although its connection with the Flycatcher's nest is infinitely remote, I cannot refrain from interpolating here something about our axe. It is a commonplace experience to be measured for a suit of clothes, but not many people have been measured for an axe. I have been. Some years ago my old friend, John C. McManus, a most expert woodsman, said he was going to rig up a couple of axes for me. He came to the office and took the length of my arms, measured how far apart

I placed my hands in grasping an axe helve, and found out whether I chopped left-handed or right-handed. In a few days he brought two axes made specially to my measurements, a small "foreman's" axe and a regular chopping axe, both fitted with beautifully shaped and finely finished white ash helves, and the blades so exquisitely sharp that they frightened me. Being far from a skilled axeman, these fine implements are rather wasted on me, but at least shortcomings in my chopping cannot be faulted to my tools. It was one of these axes we used to fell the ash.

Chopping open the nest was interesting work. It was situated about three feet below the entrance, and we could identify it positively as a Crested Flycatcher's by the typical eggshell we found in it, as well as from a "cast" of beetle wing-cases. Most of the nest material consisted of white pine needles. There were eight or ten inches deep of these, not woven or felted together, but just packed into the cavity, apparently to fill it up to a convenient height. Mixed with the pine needles were, rather surprisingly, two or three pieces of dried horse manure. This had no doubt come from a wood road which passed near here the winter before. No snake skin was to be seen in the undisturbed nest, which we photographed as the tree lay on the ice, using the focussing cloth to shelter it as well as we could from the strong wind that blew the pine needles around. Then we searched carefully through the nest for the expected snake skin. There was none there nor anything like one.

Five or six species of snakes are found here, and one, the harmless persecuted Garter-snake [*Thamnophis sirtalis*], is abundant. There can be no scarcity of cast skins in the locality. This pair of Flycatchers had broken away from the primeval tradition of their genus, unless indeed they had expressed their nest-building non-conformity with dried horse manure instead of a snake skin.

CONCERNING FAUNAL LISTS

By J. A. MUNRO



FOR MANY years, from a sense of duty and with the minimum of enthusiasm, I have read a certain type of faunal list. Series of dates and captures drearily recorded—they affected me like the rattle of dry bones. Shuddering, I read and marvelled!

Light came when, in an article by Mousley "On the birds, orchids, ferns and butterflies of Mount Royal", appeared the following:.... "We can picture Champlain in 1603, climbing the forest-clad slopes of Mount Royal, in order to obtain a clearer view of the surrounding country. How we should welcome an account

of the avifauna and flora of Mount Royal at that remote period! Nay, what would we not give for an account dating back say only fifty years ago, for as far as I know, there is nothing of the kind in existence." It was clear then that the faunal list even in its most repellent form, where it stands icily aloof from any weak concession to grace, or style, or urbanity—a bare skeleton of dates and localities—is of great value. Nothing is made in vain. This was cheering.

So also was the comforting reflection that the American Ornithologists' Union check list of 1931 would make use of published faunal lists—a belief to be rudely shattered when that quaint volume was given to an astonished word.

There remained for my confusion the common use of the third person in such writings. It seemed to suggest, on the part of the author, a modesty and a magnificent self-restraint which often enough were not otherwise apparent. And when such author, in a moment of febrile excitement, relapsed for a sentence or two into the first person singular the resulting brew seemed peculiarly unappetising, although some ornithological editors seemed to find it palatable enough. It was the accepted tradition that the third person singular, although cumbersome, archaic, pedantic, self-conscious, pretentious, stilted, affected, redundant and otherwise objectionable, nevertheless at all times was obligatory.

Then came Part I of Brewster's *The Birds of the Umbagog Lake Region of Maine*. Here was demonstrated beyond any argument, that a

competent scientist could cast aside all the cumbersome formalities, inhibitions and impedimenta of the professional "faunal lister" and create something of accurate worth that was a joy to read. In clear, simple language, such as Gilbert White or Thoreau might have used, Brewster painted his Umbagog picture. There it is recreated for all the world to enjoy! Brewster's Umbagog perhaps no longer exists but it is preserved in literature for all time. I venture to prophecy that in years to come the ornithological world will turn to Brewster just as now the literary world turns to Samuel Pepys. For the attraction in both is essentially the same. In Brewster we have an entirely human, unaffected narrative of happenings amongst the birds he loved. Unconsciously, perhaps, he created a masterpiece.

In the enthusiasm aroused by this discovery I may have exaggerated its literary worth. Perhaps so. But, compare his dignified prose with the florid extravagance of "fine writing" in some modern bird books and the latter become positively revolting.

This indecorous fulmination requires a foot note. Seriously, I am fully acquainted with the value of the faunal list. My complaint is that commonly their factual content is too meagre. Scientific natural history (recently rediscovered and christened ecology) asks for more than a check list. There have been few Brewsters, unfortunately, but surely the author of a faunal list might be asked to provide some ecological background to his picture.

MOLLUSCA OF THE OTTAWA REGION ADDITIONS AND CORRECTIONS

By A. LA ROCQUE



SINCE the publication in 1890 of the List of Mollusca¹ many additions and corrections make the publication of a new list desirable. However, two great groups of fresh-water shells, the *Planorbidae* and *Physidae* are being intensively studied, the first by Dr. F. C. Baker and the second by Dr. W. J. Clench and it is expected that their work will result in many changes which would affect such a list. Therefore it is felt that the new list should not appear before these important works have been published. In the meantime the following changes may be noted:

Lymnaea stagnalis L.

In the 1890 list no varieties of this species were mentioned. This was natural enough since Baker's work on the *Lymnaeidae*, where the American varieties were set forth clearly, did not appear until 1911. Latchford² reviewing Baker's work noted that he placed specimens from this region in the variety *appressa* and Whittaker³ identified specimens from Mackay Lake as belonging to this variety also. The

² Latchford, F.R., "Conchological Notes" *Ott. Nat.* 25:68, 1911.

³ Whittaker, F. J., "Relationship of the Fossil Marl Fauna of Mackay Lake, Ottawa, to the Present Molluscan Life of the Lake." *Ott. Nat.* 32:14, 1918.

¹ *Ottawa Naturalist* 4:54-58, 1890.

finding of specimens in Bernard Lake, which were placed by Dr. Baker in variety *lillianæ*, led me to re-examine all the specimens from the Ottawa region which were accessible to me with the following results:

Lymnæa stagnalis jugularis (Say)

All specimens from the Ottawa, Rideau, Carp, Mississippi and Gatineau rivers belong to this variety as well as specimens from the following lakes: Mackay, Chilcott, Mahon, Little Mississippi, Moncrief, Lamy, Constance, Fairy and Johnston.

Lymnæa stagnalis lillianæ F. C. Baker

Specimens belonging to this variety were found in the following lakes of the region: Bernard, Meach and Phillip, all in the province of Quebec.

It is more than probable that other lakes in the district will yield the same variety, especially the larger ones.

Helisoma infracarinatum F. C. Baker

The fine and very large *Helisoma* of the Rideau River has recently been identified by Dr. F. C. Baker with his species *infracarinatum* originally described from Western Ontario. This has usually been called *trivolis* but was quite rightly thought to be a different species by Latchford and Fletcher as far back as 1894. They say in part, of this species that it is "usually called *trivolis* but in the opinion of the leaders is quite a different species"¹. Dr. Baker also identifies specimens from Gauvreau Lake with this species and some specimens collected in various lakes in the Gatineau Valley seem very near, if not identical with, it.

¹ Latchford, F. R. & Fletcher, J.: "Report of the Conchological Branch" *Ott. Nat.* 8:98, 1894.

Bulinus tentaculatus L.

This species was noted for the Ottawa district by Latchford in 1925². The Duck Island colony mentioned has prospered and a great number of individuals were collected alive in September, 1933. Mr. G. E. Fairbairn has specimens in his collection from the foot of Bank Street, Ottawa. Another colony has established itself in a quiet bay of the Rideau River about a mile above Black Rapids and specimens which were collected there in 1929 are in the National Museum of Canada. Another lot from Hartwell's Locks on the Rideau Canal was collected in 1933. Specimens from the Rideau River and Canal are in the Fairbairn collection from the following points; Billings' Bridge, Dow's Lake, Hogsback and Black Rapids, below the dam.

Oxychilus cellarius (Müll.)

Several specimens of this species were collected by Mr. Fairbairn on the shore of the Ottawa River at the foot of Bank Street. So far as I know this is the first record of it for the Ottawa District.

Carychium exile H. C. Lea

The 1890 list mentions only one species of *Carychium* for the district: *C. exiguum*. Specimens of both *Carychium exile* and its variety *canadense* are in the Fairbairn collection and in the National Museum from the following localities:

Carychium exile H. C. Lea

QUEBEC: Wakefield; Fairy Lake, Hull.

ONTARIO: Dow Swamp, Ottawa.

Carychium exile canadense (Clapp)

QUEBEC: Wakefield.

ONTARIO: South Gloucester, Carleton Co.

² *Canadian Field-Naturalist* 39:41-43 February, 1925.

56th ANNUAL MEETING OF THE OTTAWA FIELD-NATURALISTS' CLUB.

1. MEETINGS.—Three Council meetings have been held during the year. The President entertained the Council at dinner at Murphy-Gamble's in January. Mr. P. A. Taverner and Mr. C. M. Sternberg entertained Council at meetings in their homes.

2. LECTURES.—No lectures were given during the year.

3. BIRD CENSUS.—The annual bird-census is taken in conjunction with other societies in Canada and the United States. The local bird-

census was taken on December 24th, 1933, 16 observers, in 6 parties, taking the count. 1572 individual birds were seen, including 21 species.

4. EXCURSIONS.—Excursions were held both in the spring and in the fall. Several places hitherto unvisited by the Club were selected for trips. By invitation of the Director of the Experimental Farms, Dr. E. S. Archibald, the members of the Club were guests for tea and inspection of the gardens together with members of the Ottawa and Westboro Horticultural Societies on June 21st.

The other spring excursions were as follows: McKay Lake and vicinity, leader Mr. Hoyes Lloyd, ornithology; Ottawa River at Hintonburg, leader Dr. H. F. Lewis, ornithology; Fairy Lake, leaders, Dr. R. E. DeLury, Mr. Hoyes Lloyd, and Mr. C. E. Johnson, ornithology, botany, etc; Britannia, leader, Dr. Anderson, zoology; Richmond, Franktown, Perth, Carleton Place, leader, Dr. Wilson, geology; Pink's Lake, leaders W. E. Harris and Douglas Leechman, microscopic aquatic life; Hiawatha Park, leaders, Mr. Crowson, Mr. Sternberg, Mr. Henderson, geology, botany, etc; Long Lake, leader, Mr. F. J. Fraser, geology, zoology. Attendance at the excursions averaged 20 or more. In September, Dr. McElhinney kindly conducted an excursion up the Rideau River to the Sand Pits in his yacht. The other fall excursion was in charge of Miss Whitehurst and included a visit to Partridge Lake in the Gatineau District.

5. REPRESENTATIVES TO MEETINGS OF THE ROYAL SOCIETY OF CANADA.—The President appointed Dr. F. J. Alcock to represent the Club at the meetings of the Royal Society held in May in Quebec City.

6. INTERNATIONAL COMMITTEE FOR THE PROTECTION OF THE BIRDS OF THE WORLD.—Mr. Lloyd and Dr. Lewis were, as usual, the Canadian representatives of the International Committee for the Protection of the Birds of the World.

7. PUBLICATIONS.—Mr. Lloyd, Chairman of the Publications Committee reports: "In connection with its duties the....Committee has held 4 meetings during the year. The Club periodical has been issued regularly and the volume for 1934 speaks for itself. The present plans for 1935 include a special number on the Woodcock which has been made possible by entering into an advantageous agreement with Mr. Henry Mousley."

8. FINANCE.—One complete set of *The Naturalist* has been sold during the year. The cost of publication has been reduced. As a result it is expected that there will be a balance to the credit of the Club at the close of the year.

9. INFORMATION SERVICE.—The Information Service is available to all subscribers. Questions will be answered through *The Naturalist* or by correspondence.

10. FLETCHER MEMORIAL FOUNTAIN.—Through the mediation of the Club the inscription upon the Fletcher Memorial Fountain at the Central Experimental Farm has been restored by the Department of Agriculture. The Minister of Agriculture has also agreed to have the fountain put in working order.

11. SPECIAL COMMITTEE.—Mr. Taverner, Chairman of the Special Committee appointed to increase interest in the Club, reported that suggestions had been received from affiliated societies and that these suggestions had all been considered with care.

12. MEMBERSHIP COMMITTEE.—The Membership Committee has only small results to report this year; but with generally improving conditions it looks forward to more work and greater achievements in the coming year.

13. COUNCIL.—It is with pleasure that, as members of Council we review the year's work and its results. In retiring from office, your Council wishes to express every hope for a good year to come, considered both from the scientific and the financial point of view. Our very best wishes go to the incoming Council and Executive.

M. E. WILSON

President

GRACE S. LEWIS

Secretary.

STATEMENT OF FINANCIAL STANDING
OTTAWA FIELD-NATURALISTS' CLUB, 30 NOVEMBER, 1934

ASSETS		LIABILITIES	
Balance in Bank, 30 November, 1934..	\$116.24	H. Mousley (Payment on acct. in re "Woodcock" article).....	\$100.00
(Less cheque outstanding)		Balance	36.88
Bills receivable.....	20.64		
	<u>\$136.88</u>		<u>\$136.88</u>
		DISBURSEMENTS	
RECEIPTS		Printing and mailing The Canadian Field-Naturalist.....	\$953.90
Balance, 30 November, 1933.....	\$ 4.27	Editor's Honorarium	90.00
Fees—Current.....	815.67	Postage and Stationery.....	48.54
" —Advance.....	64.18	Bank discount.....	24.14
Advertisements.....	47.00	Separates and Illustrations.....	113.14
Single and back numbers.....	183.67	Miscellaneous.....	16.29
Separates and Illustrations.....	81.56	Balance in bank, 30 November, 1934..	
Miscellaneous	165.90	(Less cheque outstanding).....	116.24
	<u>\$1362.25</u>		<u>\$1362.25</u>

10 December, 1934.
WILMOT LLOYD, Treasurer.

10 December, 1934.
HARRISON F. LEWIS, Auditor.

STATEMENT—RESERVE FUND
30 NOVEMBER, 1934

ASSETS		LIABILITIES	
Canadian Government Bonds.....	\$1200.00	NIL—	
Cash in Bank, 30 November, 1934....	138.01	Balance.....	\$1338.01
	<u>\$1338.01</u>		<u>\$1338.01</u>
		DISBURSEMENTS	
RECEIPTS		NIL—	
Balance in Bank, 30 November, 1933..	\$ 71.74	Balance.....	\$138.01
Bond Interest.....	64.00		
Bank Interest.....	2.27		
	<u>\$138.01</u>		<u>\$138.01</u>

10 December, 1934.
WILMOT LLOYD, Treasurer.

10 December, 1934.
HARRISON F. LEWIS, Auditor.

EDWARD F. G. WHITE, Chairman,
Reserve Fund Committee.

STATEMENT—PUBLICATION FUND
30th NOVEMBER, 1934

ASSETS		LIABILITIES	
Canadian Government Bonds.....	\$800.00	NIL—	
Cash in Bank.....	52.95	Balance.....	\$852.95
	<hr/> \$852.95		<hr/> \$852.95
RECEIPTS		DISBURSEMENTS	
Balance in bank, 30 November, 1933..	\$51.35	Canadian Field-Naturalist.....	\$44.00
Bond Interest.....	44.00	Balance in bank, 30 November, 1934..	52.95
Bank Interest.....	1.60		
	<hr/> \$96.95		<hr/> \$96.95

10 December, 1934.

WILMOT LLOYD, Treasurer.

10 December, 1934.

HARRISON F. LEWIS, Auditor.

CHRISTMAS BIRD CENSUSES, 1934

MONTREAL (AND DISTRICT), QUEBEC, DECEMBER 23, 1934.—Weather overcast and cold; fresh N. E. breeze; mean temperature for the day at McGill University 14°F.; snow covering ground 6 to 8 inches deep.

The main census party visited Chambly and walked through the woods to the Richelieu River. They were out from 11.00 a.m. to 4.30 p.m. Other parties visited the following localities: St. Lambert (Terrill, 8.00 a.m.), Isle Jesus (W. J. Brown), St. Genevieve (W. A. Sait), Mount Royal (Wynne-Edwards, 7.00 a.m. to 8.30 a.m.), Montreal West (Nicol, 8 a.m.).

American Golden-eye, 3; Canada Ruffed Grouse, 1; Woodpecker (*Dryobates villosus* (subsp. ?)), 1; Northern Downy Woodpecker, 4; Northern Blue Jay, 1; Eastern Crow, 3; Black-capped Chickadee, 23; White-breasted Nuthatch, 2; Brown Creeper, 1; Eastern Robin, 2; Starling, 69; English Sparrow (not counted). Total, 12 species, 110 individuals (plus English Sparrows).

Additional species seen recently include Snowy Owl, Golden-crowned Kinglet, Snow Bunting.—H. A. C. Jackson, A. C. Nicol, R. A. Outhet, L. McL. Terrill, V. C. Wynne-Edwards (Members of the Province of Quebec Society for the Protection of Birds).

OTTAWA, ONTARIO, DECEMBER 23, 1934.—The Christmas Bird Census for 1934 was taken on this date by the combined efforts of twenty-one observers, organized in eight separate parties. The weather was unfavorable, for a strong east wind, varying in velocity from 26 miles an hour to 40 miles an hour, blew throughout the day, driving much loose, dry snow before it, while the temperature ranged from -6.7° at 8.00 a.m. to 5° at 4.30 p.m. The sky was heavily clouded all day and a light fall of snow occurred during the latter part of the afternoon.

The combined report of the census parties, which is published herewith, is remarkable chiefly for the entire absence of several species that are commonly found near Ottawa at Christmas time and for the unusual scarcity of some of the species that were observed.

It will be noted that this census report contains fewer species than usual and includes no Hawks, Owls, Jays, or Red-breasted Nuthatches, and none of the tree-inhabiting winter finches, such as Eastern Purple Finches, Eastern Goldfinches, Northern Pine Siskins, Redpolls, Canadian Pine Grosbeaks, Eastern Evening Grosbeaks and Crossbills. The absence of the tree-inhabiting winter finches is the more noteworthy because there is a good crop of mountain ash berries around Ottawa this year and the local crop of cones on the coniferous trees is fairly good.

The Black-capped Chickadee, the Canada Ruffed Grouse, and the Northern Downy Woodpecker are represented in the census report but in unusually small numbers. On examining the Christmas Bird Census reports from Ottawa for the thirteen years beginning with 1921, which are the years prior to 1934 in which such censuses for this vicinity were made by several co-operating field parties, we find that the average number of Black-capped Chickadees reported annually is 128, and the lowest number in any one census is 33, in 1921, which figures may be compared with the total of 5 of these birds found in the 1934 census. The average number of Canada Ruffed Grouse reported in these thirteen censuses is 7.5 and the lowest number in any one census is 2, in 1928, to be compared with 2 of these birds reported in this year's census. The scarcity of these Grouse this winter is in accord with the predicted cycle of abundance for this markedly cyclic species, and is in contrast with its abundance in 1931, when 14 were included in the census; in 1932, when 12 were reported in the same way, and in 1933, when 8 were seen by the census-takers. The average number of Northern Downy Woodpeckers appearing in the thirteen censuses for the years 1921-1933 is 9, the smallest numbers for one year's census being 1 in 1925 and 2 in 1921, to be compared with 3 found during the census of 1934.

By way of contrast, it may be mentioned that the total of 6 Song Sparrows in the 1934 census is much the largest number of this species to be found in any Christmas Bird Census at Ottawa, the previous maximum number being 2, reported in 1924, 1927, and 1930. The 6 Song Sparrows seen in 1934 were found in a single group a short distance south of the city.

The parties participating in the taking of the 1934 census and the routes followed, in East, South, West, North order were: (1) Hoyes Lloyd, Peggy Whitehurst, and Nell Whitehurst, 8.00 a.m. to 4.00 p.m., south bank of Ottawa River, eastward from Rideau Gate to Ottawa airport, including Village of Rockcliffe Park, property of Federal District Commission, and Beechwood Cemetery, 16 miles by auto, 5 miles on foot; (2) R. M. Anderson, 10.00 a.m. to 12.00 a.m., Ottawa East and along Rideau River to Main Street, returning by Echo Drive, 4 miles on foot; (3) C. M. Sternberg, Stanley Sternberg, Giffard Johnson, Revell Johnson, and G. W. Dennis, 9.00 a.m. to 12.30 p.m., Bronson Avenue, including refuse-dump and south along Metcalfe Road, 8½ miles by auto, 4 miles on foot; (4) R. E. DeLury and D. B. DeLury, 8.00 a.m. to 12.30 p.m., Experimental Farm, Rideau Canal and River to Hog's Back, and beyond nearly to Hunt Club, and return, 13 miles by auto, 3 miles on foot; (5) B. A. Fauvel and H. Bowers, 9.15 a.m. to 11.20 a.m., Ottawa Waterworks to Woodroffe, 5 miles on foot; (6) Harrison F. Lewis, G. H. Hammond, Barnard McL. Lewis, and C. R. Lewis, 7.45 a.m. to 11.30 a.m., and 1.15 p.m. to 4.15 p.m., Ottawa South via Champlain Bridge to Deschenes, Aylmer, and Queen's Park, 12 miles by auto, 10 miles on foot; (7) Arthur B. Nelles and Harlow Wright, 9.30 a.m. to 4.30 p.m., Old Chelsea to Kingsmere and Wrightville, 12 miles on skis; (8) W H. Lanceley and R. F. Clarke, 9.30 a.m. to 12.30 p.m. and 2.00 p.m. to 5.00 p.m., Fairy Lake, Ironside, Farmer's Rapids and region N.E. for 2 miles, 20 miles by auto, 8 miles on foot.—Harrison F. Lewis, *Chairman of Bird Census Committee.*

CHRISTMAS BIRD CENSUS, OTTAWA, ONTARIO, DECEMBER 23, 1934.

ROUTE NOS. AS IN TEXT,									
Species* of Birds	1	2	3	4	5	6	7	8	Total
American Golden-eye	18	...	...	...	7	13	...	...	38
Canada Ruffed Grouse	...	...	...	...	...	...	2	...	2
Eastern Hairy Woodpecker	1	...	1	1	...	1	2	...	6
Northern Downy Woodpecker	1	...	...	1	...	1	...	...	3
Eastern Crow	1	15	325	170	...	4	...	...	515
Black-capped Chickadee	2	...	...	...	...	1	...	2	5
White-breasted Nuthatch	4	...	...	2	...	...	...	...	6
Brown Creeper	...	...	...	2	...	2	...	...	4
Eastern Robin	...	...	...	1	...	...	...	...	1
Northern Shrike (?)	...	...	...	...	...	...	1	...	1
Starling	...	150	50	12	...	2	...	...	214
English Sparrow	14	250	450	50	25	51	30	70	940
Eastern Tree Sparrow	...	...	...	1	...	...	...	4	5
Eastern Song Sparrow	...	...	6	...	...	...	...	...	6
Eastern Snow Bunting	...	...	...	810	...	32	...	...	842
Total individuals	41	415	832	1050	32	107	35	76	2588
Total number of species	7	3	5	10	2	9	4	3	15

*Subspecies determined geographically.

PAKENHAM, ONTARIO, DECEMBER 24, 1934.—8.30 a.m. to noon and 1.30 p.m. to 4.00 p.m., clear sky, bright sunshine, light west wind; 12 inches of snow; temp. 28° at start, 15° at 4.00 p.m. Observers separate; total distance travelled, 20 miles.

Eastern Hairy Woodpecker, 2; Northern Blue Jay, 2; Black-capped Chickadee, 28; White-breasted Nuthatch, 3; Red-breasted Nuthatch, 9; Brown Creeper, 1; Eastern Golden-crowned Kinglet, 2; Starling, 1; English Sparrow, 8; Eastern Purple Finch, 1; White-winged Crossbill, 26; Eastern Snow Bunting, 21. Total, 12 species, 104 individuals.

Blue Jays and Canada Ruffed Grouse are very plentiful, though the latter are on the wane. No Canada Ruffed Grouse could be found on census day, although many were seen the day previous, all hidden in the loose snow. No Grosbeaks have been seen this season. An Eastern Goshawk was identified November 23rd. The most interesting features of the day's hunt were the finding of the Eastern Purple Finch giving its whistling call and the presence again of Red-breasted Nuthatches. The count of Woodpeckers was disappointing as we missed both the Northern Downy and the Northern Pileated Woodpeckers, which are present.—EDNA G. ROSS, VERNA M. ROSS, ALLAN F. ROSS, WILMER ROSS.

ARNPRIOR, ONTARIO, DECEMBER 25, 1934.—10.00 a.m. to 5.00 p.m., fine weather, 12 inches snow on ground, wind easterly, light, temp., 7° at start, 9° at return. Eighteen miles on snowshoes. Observers separate.

Canada Ruffed Grouse, 7; Great Horned Owl, 2; Richardson's Owl, 1; Eastern Hairy Woodpecker, 2; Northern Downy Woodpecker, 2; Northern Blue Jay, 5; Black-capped Chickadee, 6; White-breasted Nuthatch, 5; Red-breasted Nuthatch, 1; Eastern Golden-crowned Kinglet, 3; Northern Shrike, 1; Starling, 25; English Sparrow, 1 plus; White-winged Crossbill, 25; Eastern Purple Finch, 6; Eastern Tree Sparrow, 1; Eastern Snow Bunting, 275 (est.). Total, 17 species, 368 (plus) individuals. Subspecies determined geographically.

Noteworthy this year are the presence of an Eastern Tree Sparrow, a rare winter species here, and the absence of Eastern Evening Grosbeaks, a considerable flock of which nearly always winters in Arnprior. Black-capped Chickadees are remarkably scarce. It is the one species that has appeared, always in good num-

bers, in all our 22 Christmas Bird Censuses, but this year we saw only one group of 6 individuals.—LIGUORI GORMLEY and CHARLES MACNAMARA.

ATHENS, ONTARIO, DECEMBER 31, 1934.—2.00 p.m. to 5.00 p.m., cloudy, with a moderate north-east wind. Temp., 12°. Snow on ground about ten inches deep. About 4 miles, through evergreens and swamps, southwest of Athens. Observers together. Subspecies determined geographically.

Canada Ruffed Grouse, 1; Northern Blue Jay, 2; Black-capped Chickadee, 12; White-breasted Nuthatch, 2; Eastern Tree Sparrow, 10. Total, 5 species, 27 individuals.—JEAN CHANT, MURRAY W. CURTIS.

TORONTO, ONTARIO, DECEMBER 23, 1934.—The 10th Christmas Bird Census of the Brodie Club was taken on December 23, 1934. The day was cloudy with a trace of rain, locally, in the afternoon. The maximum temperature was 38° and the minimum 18°. About 4 inches of snow covered the ground and all still water was frozen. The weather has been moderate so far this season compared with one year ago but December has had considerable snowfall and several "spells" of zero or near zero temperatures.

Thirty-five observers took part and succeeded in compiling the greatest number of both species and individuals yet obtained. Three species, Kittiwake (sp.?), Wilson's Snipe and Snowy Owl, were new to the lists and make a total of eighty-three which have appeared on Brodie Club censuses. The Kittiwake, a most unexpected addition, was identified by T. M. Shortt at Sunnyside and sketched at close range. It is a long time since this bird has appeared on any local list and upwards of 40 years since the last Toronto specimen was taken. This individual, or another of the same species, was observed by F. H. Emery at Toronto Island on December 16th. The appearance of this marine species might be connected in some way with the unusual number of Great Black-backed and Glaucous Gulls also observed.

The large total of individual birds is partly accounted for by the greatest number of Greater Scaup Ducks and Starlings so far recorded on a census, also by a rather high count of other wintering ducks and Herring Gulls. Northern species of land birds, it will be noted, were

rather scarce, while several species usually associated with an open winter were well represented.

Observations were carried on from 8.00 a.m. to 4.00 p.m. and those taking part were distributed over the usual routes as follows. 1. J. B. Armstrong, H. M. Halliday, D. Scott, A. F. Smith, D. Sumner, S. L. Thompson, 2 G. S. Bell, R. G. Dingman, R. E. Bennett, T. F. McIlwraith,

R. Russell, L. L. Snyder, R. J. Rutter. 3. J. R. Dymond, S. Downing, Wm Holden, C. Hope, D. MacLulich, H. Richardson. 4. W. Mansell, A. Smith, R. Smyth, T. M. Shortt. 5. J. L. Baillie, Jr., P. Harrington. 6. R. V. Lindsay, R. M. Saunders, H. Southam. 7. G. E. McDougall, O. Devitt, C. Maloney. 8. H. H. Brown, H. G. Macklin, F. H. Emery, C. Richards. — THE BRODIE CLUB.—R. J. RUTTER, *Secretary*.

CHRISTMAS BIRD CENSUS OF THE BRODIE CLUB—TORONTO
DECEMBER 23, 1934.

Species	Parties	1	2	3	4	5	6	7	8	Totals
Greater Scaup Duck	.....	.....	.....	.....	3	50	600	25	.....	678
American Golden-eye	.....	.....	.....	.....	84	230	7	5	.....	326
Buffle-head	.....	.....	.....	.....	.....	7	.....	.....	.....	7
Old-squaw	.....	.....	.....	.....	14	200	405	.....	.....	619
Hooded Merganser	.....	.....	.....	.....	1	.....	1	.....	.....	2
American Merganser	.....	.....	1	3	1	.....	.....	.....	.....	5
Eastern Red-tailed Hawk	1	3	.....	1	1	.....	.....	.....	.....	6
American Rough-legged Hawk	.....	3	.....	.....	.....	.....	2	.....	.....	5
Eastern Sparrow Hawk	.....	.....	.....	.....	.....	.....	1	.....	.....	1
Canada Ruffed Grouse	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Ring-necked Pheasant	2	13	5	16	3	2	3	.....	.....	44
Wilson's Snipe	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Glaucous Gull	.....	.....	.....	2	.....	4	.....	.....	.....	6
Great Black-backed Gull	.....	.....	.....	5	13	16	.....	.....	.....	34
Herring Gull	100	48	64	243	250	912	20	.....	.....	1637
Ring-billed Gull	50	3	.....	3	2	.....	.....	.....	.....	58
Kittiwake (sp.?)	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Eastern Screech Owl	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Snowy Owl	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Long-eared Owl	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Short-eared Owl	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Eastern Belted Kingfisher	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Northern Flicker	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Eastern Hairy Woodpecker	.....	3	.....	1	1	.....	.....	.....	.....	5
Northern Downy Woodpecker	2	7	5	4	1	1	5	1	.....	26
Northern Blue Jay	2	13	4	12	4	.....	6	3	.....	44
Eastern Crow	2	13	5	.....	.....	.....	.....	.....	.....	20
Black-capped Chickadee	6	10	2	7	22	.....	8	8	.....	63
White-breasted Nuthatch	.....	5	.....	2	1	.....	2	1	.....	11
Brown Creeper	1	3	1	2	1	.....	.....	.....	.....	8
Eastern Robin	.....	5	.....	2	.....	.....	.....	.....	.....	7
Eastern Golden-crowned Kinglet	.....	.....	3	8	.....	.....	4	2	.....	17
Cedar Waxwing	.....	85	4	.....	.....	1	.....	.....	.....	89
Northern Shrike	.....	.....	.....	2	.....	1	.....	.....	.....	3
Starling	200	105	325	703	53	58	30	40	.....	1514
English Sparrow	.....	Seen by	all parties—not counted.							
Eastern Cardinal	.....	.....	2	.....	.....	.....	.....	.....	.....	2
Eastern Purple Finch	.....	2	.....	.....	.....	.....	16	.....	.....	18
Eastern Goldfinch	.....	.....	2	.....	.....	.....	.....	12	.....	14
Slate-colored Junco	2	9	28	1	.....	1	.....	35	.....	76
Eastern Tree Sparrow	8	23	17	29	.....	14	2	1	.....	94
Swamp Sparrow	.....	.....	.....	1	.....	.....	.....	.....	.....	1
Song Sparrow (subsp.?)	2	11	2	8	.....	1	.....	.....	.....	24
Eastern Snow Bunting	8	25	.....	.....	.....	.....	.....	.....	.....	33
Total Individuals	386	393	470	1159	840	2028	127	103	5506	
Total Species	15	25	17	28	18	19	14	10	44	

Subspecies determined geographically.

TORONTO, ONTARIO, DECEMBER 30, 1934.—9.00 a.m. to 1.00 p.m.; clear and bright; wind N.W., moderate; temp., 0.4°; 6 to 8 inches of snow on ground. Total mileage of parties, 56 miles by automobile, 14 by street-car, 19 on foot.

Thirty-three members of the Toronto Field-Naturalists' Club participated in the taking of this Christmas Bird Census. They were divided into five groups, each working in a separate district, as follows:

Districts	Group Leaders
Sunnybrook Park	Stuart L. Thompson
Ashbridge's Bay	T. F. McIlwraith and F. H. Emery.
High Park	R. V. Lindsay
Lake Shore	Murray Speirs
Cedar Vale	Stuart Downing.

Holboell's Grebe, 1; Great Blue Heron, 1 (R.V.L.); Common Mallard, 1; Black Duck (subsp.?), (believed to be feral), 60; Baldpate, 1; Scaup Duck (sp.?), 100; American Golden-eye, 92; Buffle-head, 2; Old-squaw, 99; White-winged Scoter, 1; Hooded Merganser, 2 (M.S.); American Merganser, 16; Red-breasted Merganser, 2; Cooper's Hawk, 1; Eastern Red-tailed Hawk, 1; American Rough-legged Hawk, 4; Eastern Sparrow Hawk, 1; Ring-necked Pheasant, 15; Red-backed Sandpiper, 1 (R.V.L.); Glaucous Gull, 2; Great Black-backed Gull, 24; Herring Gull, 959+; Ring-billed Gull, 11; Horned Owl (subsp.?) (doubtful), 1; Eastern Hairy Woodpecker, 4; Northern Downy Woodpecker, 7; Northern Blue Jay, 5; Eastern Crow, 34; Black-capped Chickadee, 34; White-breasted Nuthatch, 2; Brown Creeper, 5; Eastern Golden-crowned Kinglet, 2; Starling, 100; English Sparrow, 100+; Eastern Purple Finch, 12; Redpoll (sp.?), 50; Eastern Goldfinch, 20; Slate-colored Junco, 50; Eastern Tree Sparrow, 56; Song Sparrow (subsp.?), 14; Eastern Snow Bunting, 1. Total, 41 species, 1894 individuals. Subspecies determined geographically. — ARNOTT M. PATTERSON, *President, Toronto Field-Naturalists' Club.*

VINELAND, ONTARIO, DECEMBER 24, 1934.—9.00 a.m. to 1.00 p.m. Weather fairly cold, temp., 22° at beginning of census, 26° at end. Sky overcast, wind west, moderate. Two inches of snow on the ground.

Route followed: Shore of Lake Ontario, Experimental Farm, farm land and woods on top of the escarpment, edge of Jordan Marsh, and small area of heavily timbered land. Five miles on foot, remainder by automobile. Observers together most of time.

Very noticeable this year was the absence of some species usually found in the taking of our Christmas Bird Census, such as Herring Gull, Eastern Crow, and Song Sparrow (subsp.?). Species that were seen on more than one occasion very close to our census date were Eastern Sparrow Hawk and Northern Flicker. Starlings are much more numerous than our returns indicate and one observer saw a flock of many hundreds of them an hour or so after the census had ended.

Duck (2 species, probably Scaup Duck (sp.?) and female Common Mallard), 5; Ring-necked Pheasant, 2; Red-headed Woodpecker, 1; Eastern Hairy Woodpecker, 1; Northern Downy Woodpecker, 6; Black-capped Chickadee, 4; White-breasted Nuthatch, 4; Brown Creeper, 3; Starling, 2; English Sparrow, a few; Slate-colored Junco, 12; Eastern Tree Sparrow, 6; Eastern Snow Bunting, 75 (about). Total, 14 species, 121 individuals (plus English Sparrows). — W. E. HURLBURT, D. ROSS, F. STRONG.

HAMILTON, ONTARIO, DECEMBER 27, 1934.—The day was clear but cold. The ground was covered with three inches of snow. The temperature varied from 8° to 24°. The wind was moderate and from the N. W. Observers, organized in 7 parties, were out from dawn till dark. All observers were on foot except one, who used a bicycle. Distance travelled, 40 miles. The principal territory covered was Burlington Bay and the Dundas Marsh.

Horned Grebe, 3; Double-crested Cormorant, 2; American Bittern, 1 (E.O.S.); Common Mallard, 4; Red-legged Black Duck, 450; Green-winged Teal, 1 (G.W.N.); Greater Scaup Duck, 200; American Golden-eye, 235; Buffle-head, 1; Old-squaw, 12; American Merganser, 130; Cooper's Hawk, 1; Eastern Red-tailed Hawk, 1; American Rough-legged Hawk, 3; Northern Bald Eagle, 1; Eastern Sparrow Hawk, 1; Canada Ruffed Grouse, 7; Ring-necked Pheasant, 8; American Coot, 1 (G.W.N.); Glaucous Gull, 3; Great Black-backed Gull, 102; Herring Gull, 3450; Ring-billed Gull, 50; Northern Flicker, 1; Eastern Hairy Woodpecker, 1; Northern Downy Woodpecker, 19; Northern Blue Jay, 20; Eastern Crow, 5; Black-capped Chickadee, 53; White-breasted Nuthatch, 5; Brown Creeper, 3; Carolina Wren, 1 (J.H.W.); Eastern Golden-crowned Kinglet, 1; Cedar Waxwing, 72; Starling, 550; English Sparrow, 355; Eastern Cardinal, 2; Eastern Goldfinch, 2; Slate-colored Junco, 58; Eastern Tree Sparrow, 187; Eastern Song Sparrow, 13. Total, 41 species, 6015 individuals.

The Green-winged Teal was observed on Burlington Bay. A bird of this species had been seen in Dundas Marsh on December 24 by J. H. Williams. The American Coot was observed at Burlington Canal with the aid of a telescope. The usual identification marks of the American Bittern, for which there is a January record at Hamilton in a previous year, were noted. This is the second winter in which a Carolina Wren has been seen in La Salle Park. It was observed this winter on December 24, as well as on census day. When seen during the taking of the census, it was uttering its call, but not its song.

The following additional species of birds were observed near Hamilton in the days either just before or just after the census day: Eastern Screech Owl, Snowy Owl, Eastern Winter Wren, Eastern Robin, Eastern Meadowlark, Eastern Purple Finch, Swamp Sparrow, Lapland Longspur.—William Brown, Mrs. MacLoughlin, Miss E. Malcolm, Dr. and Mrs. McMillan. Rev. Calvin McQuesten, Miss R. Mills, George W. North. Mr. and Mrs. H. C. Nunn, Roger Nunn, Miss Emma O. Smith, Vernon Trott, J. H. Williams (*Hamilton Bird Protection Society*).

CREDIT FORKS, PEEL COUNTY, ONTARIO, DECEMBER 24, 1934.—11.30 a.m. to 3.45 p.m., partly cloudy, no wind, temp., 29° at start, 31° at finish. About 4 inches of snow on ground. Approximately 2½ miles on foot through dense mixed woods.

Eastern Hairy Woodpecker, 1; Northern Downy Woodpecker, 3; Northern Blue Jay, 7; Black-capped Chickadee, 6; White-breasted Nuthatch, 1; Eastern Purple Finch, 6; Eastern Goldfinch, 6; Slate-colored Junco, 20; Eastern Tree Sparrow, 15; Eastern Snow Bunting, 1. Total, 10 species, 65 individuals.—C. E. HOPE.

KITCHENER, ONTARIO, DECEMBER 28, 1934.—Combined list of four field parties. First party, on foot, 8.30 a.m. to 1.30 p.m., except writer to 5.30, to Grand River at point about a mile below Bridgeport via New Park and Bridgeport Dam, two younger members returning home via Springwood Park, writer continuing down-river to Gabel's Swamp (what's left of it!), whence cross-country to East-end Swamp, 6 miles plus writer's extra jaunt, at least 12 miles, 18 species (G.W.K.); second party, 10.00 a.m. to 4.30 p.m., to "friend's farm", mostly by car, total about 25 miles (object, rabbit-hunting), 2 species; third

party, 1.30 p.m. to 4.00 p.m., to Grand River near where first party divided and fields between there and home, 4 miles, 13 species; fourth party, 1.00 p.m. to 4.30 p.m., east Waterloo to Bridgeport Dam, 4 miles by auto, 4 on foot, 10 species. Overcast all day; miserable outing weather; light to moderate easterly winds; temp. about 20°-27°-30°; several hours light sleet after 4.30 p.m., 10 inches of snow on ground. Subspecies are presumed on geographical grounds. A fair bird-list, considering poor visibility and virtual absence of erratic boreal finches, birds of prey, and ducks.

Canada Ruffed Grouse, 8; Herring Gull, 1; Ring-billed Gull, 1 (adult, close range, detected ring on bill, noted smaller size, through 8X binoculars—G.W.K.); Eastern Hairy Woodpecker, 3; Northern Downy Woodpecker, 3; Northern Blue Jay, 30 (est.—restless, largely in white-cedar, hard to count; certain other species even worse); Black-capped Chickadee, 50+; White-breasted Nuthatch, 4; Brown Creeper, 9; Eastern Golden-crowned Kinglet, 5; Cedar Waxwing, 10 (1 flock, seen also December 22); Northern Shrike, 1 (though observed hotly pursuing an Eastern Snow Bunting almost a quarter of a mile, up-river, would-be victim was not seen to be caught!—party no. 3); Starling, 65; English Sparrow (common, but uncounted as usual); Eastern Goldfinch, 80 (est.) (unexpectedly numerous—nearly 60 atop one yellow birch, in Gabel's Swamp; flock scanned for Siskins, Redpolls—no luck!); Slate-colored Junco, 20 (est.); Eastern Tree Sparrow, 25; Song Sparrow (subsp.,?), 9 (comparatively common, locally, this winter; more than for several years); Lapland Longspur, 1 (noted amidst the Eastern Snow Buntings; "bird of the day", contrastive marks of identification repeatedly discerned through 8X glasses—G.W.K.); Eastern Snow Bunting, 300 (est.) (1 compact flock, a boisterous, inspiringly dynamic continual swirl of Arctic sprites!). Total, 20 species, 625 individuals, plus English Sparrows. Noted locally since early November: Eastern Pigeon Hawk (1 immature near home), November 11 (evidently a decidedly late date), observed closely through 8X glasses; writer's first of species in town in nearly 8 years); Wilson's Snipe (at least 2 distinctly heard at dusk on November 24, Bridgeport Dam; 2 observed December 15, 1 at each of two small marshy or creek-drained areas within city near its north edge); Eastern Mourning Dove (1, flushed by writer from weedy hill beside gravel-pit near Bridgeport Dam, on November 24; bird not seen since, not likely to

have migrated, rather likely to have perished); Eastern Screech Owl (November 24, December 27; probably other instances); Snowy Owl (1 reported by farmer friend, mile south of city, about November 15); Eastern Winter Wren (1 on November 16, at least 2 since, vicinity of Bridgeport Dam); Eastern Robin (1 reported seen about a week before Christmas); Bohemian Waxwing (1 reported as seen about November 1, larger size and distinctive wing-markings observed in direct contrast with corresponding characters of Cedar Waxwings); Eastern Purple Finch (3, November 16; 5, December 27—at and near Bridgeport Dam). The Eastern Cardinal, here in small (and apparently varying) numbers since at least 1929, seems not to have been reported by any one for several weeks or longer, strangely enough.—G. W. Knechtel. *Respective field parties*: Lorne Wettlaufer, Douglas Hagen, G. W. Knechtel; F. A. Shantz; Fred Cooper, Herbert Longstreet; F. W. R. Dickson, F. H. Montgomery, C. B. Price ("Kitchener-Waterloo Nature Club").

WOODSTOCK, ONTARIO, DECEMBER 30, 1934.—10.00 a.m. to 5.00 p.m., clear and bright, wind N.W., very light, hard crust on deeply drifted snow, temp., 10° at 10.00 a.m.

Observers in one party at first, later dividing into three parties, but all working in the same district, viz.; Sweaburg Swamp, the woods around Hodge's Pond, and the springs which supply the city's water. Mileage covered: 4 miles by automobile, 9 miles on foot.

Eastern Ruffed Grouse, 7; Ring-necked Pheasant, 1; Eastern Hairy Woodpecker, 2; Northern Downy Woodpecker, 1; Northern Blue Jay, 2; Eastern Crow, 10; Black-capped Chickadee, 35+; White-breasted Nuthatch, 1; Eastern Robin, 1; Eastern Golden-crowned Kinglet, 5; Cedar Waxwing, 1; Starling 8; English Sparrow, 50+; Slate-colored Junco, 40+(1 flock); Eastern Tree Sparrow, 4; Eastern Snow Bunting, 150+ (1 flock). Total, 16 species, 318+ individuals.

Also seen during the past week; Common Mallard, 1; Sharp-shinned Hawk, 1; Herring Gull, 1; Red-headed Woodpecker, 2.

Mammals seen: Grey Squirrel, 2; Red Squirrel, 1; Chipmunk, 1; Cottontail, 1; European Hare, 2.—E. Dutton, G. Nutt, C. Cooke, C. Pooley, H. Schroers, H. Milnes, B. Dutton, H. Battae and V. Utting (*Woodstock Naturalist Society*).

LONDON, ONTARIO, DECEMBER 22, 1934.—The plan and route followed this year were practically the same as on previous occasions, the valley of the River Thames between the city and Delaware proving to be the best ground, although not as many Ducks as usual were observed on account of the river being pretty well frozen up. A large number of summer birds are apparently attempting to winter over, some being species that are rarely met with in winter. The almost complete absence of boreal species is marked. The weather was just about ideal, sky slightly overcast, but visibility still quite good. Temperature just below freezing throughout the day. Ground covered with about 8 inches of snow. Wind very, very light. The list which follows is the combined one of ten parties consisting of 16 individuals some of whom went out in the morning, some in the afternoon and some both times, practically from daylight until dark. This is the best list we have ever made, topping our 1931 census by one species. As specimens were not taken, the identifications are not positive, some being queried, others put in as those which are normally supposed to be present in this district.

Great Blue Heron, 1; Common Mallard, 1; American Golden-eye, 19; Old-squaw, 6; American Merganser, 37; Cooper's Hawk, 1; Eastern Red-tailed Hawk, 2; Northern Red-shouldered Hawk, 1; American Rough-legged Hawk, 3; Northern Bald Eagle, 1; Ruffed Grouse (subsp.?), 3; Eastern Bob-white, 12; Ring-necked Pheasant, 70; Herring Gull, 61; Eastern Mourning Dove, 3; Eastern Screech Owl, 1; Great Horned Owl, 1; Eastern Belted Kingfisher, 7; Northern Flicker, 1; Red-headed Woodpecker, 1; Yellow-bellied Sapsucker, 1; Eastern Hairy Woodpecker, 13; Northern Downy Woodpecker, 26; Horned Lark (subsp.?), 1; Northern Blue Jay, 79; Eastern Crow, 100; Black-capped Chickadee, 79; White-breasted Nuthatch, 18; Brown Creeper, 6; Eastern Winter Wren, 1; Catbird, 1; Eastern Golden-crowned Kinglet, 32; Northern Shrike, 1; Starling, 941; English Sparrow, (estimated) 300; Eastern Red-wing, 1; Eastern Cardinal, 16; Eastern Purple Finch, 23; Eastern Goldfinch, 2; Red-eyed Towhee, 5; Slate-colored Junco, 23; Eastern Tree Sparrow, 44; Song Sparrow (subsp.?), 6; Eastern Snow Bunting, 360.

Total, 44 species, 2311 individuals.

Also seen within a week, but missed on census day: Cedar Waxwing (several flocks), also Eastern Robin, 4; as well as another Red-eyed Towhee. A Snowy Owl was shot near here quite recently.—E. M. S. DALE, *Chairman Census Committee*, McIlwraith Ornithological Club.

NORTH BAY, ONTARIO, DECEMBER 23, 1934.—10.30 a.m. to 3.00 p.m., cloudy, snowing, temp. about 8° all day; wind north-east, strong; 8 inches of snow on ground. North along T. & N. O. Ry. to Trout Lake, west about 2 miles, south to North Bay; about 11 miles on foot. Subspecies determined geographically.

Eastern Goshawk, 1; Woodpecker (*Dryobates villosus* (subsp.?)), 2; Northern Downy Woodpecker, 1; Black-capped Chickadee, 13; White-breasted Nuthatch, 3; Starling, 8; English Sparrow, 16. Total, 7 species, 44 individuals. — ROBERT D. LOCKWOOD.

AWEME, MANITOBA, DECEMBER 26, 1934.—8.30 a.m. to 5.00 p.m. Weather bright to cloudy, with light snow; temp., maximum, —11.4°, minimum, —38.5°. Six and one-half inches of snow on ground.

Eastern Goshawk, 1; Golden Eagle, 2; Canada Ruffed Grouse, 17; Prairie Sharp-tailed Grouse, 14; Horned Owl (subsp.?), 1; Eastern Hairy Woodpecker, 2; Northern Downy Woodpecker, 4; Northern Blue Jay, 2; American Magpie, 1; Black-capped Chickadee, 7; Shrike (*Lanius borealis* (subsp.?)), 1; English Sparrow, 47; Evening Grosbeak (subsp.?), 2; Pine Grosbeak (subsp.?), 6; Eastern Snow Bunting, 125. Total, 15 species, 232 individuals.

Goshawks are quite common and are taking heavy toll of the Grouse. Owls are scarce; no small ones have been seen this winter. Redpolls are rare and Grouse are much below last year's numbers.—STUART CRIDDLE.

EASTEND, SASKATCHEWAN, DECEMBER 30, 1934.—9.30 a.m. to 1.00 p.m. Overcast, occasional bright sun, light west breeze, temp. at start, —8°, at finish, 4°. Snow mostly in drifts, about two inches on the level, high spots bare. Valley of the Frenchman River. Six miles on foot.

Prairie Sharp-tailed Grouse, 12; European Partridge, 7; Horned Lark (subsp.?), 3; American Magpie, 7; Long-tailed Chickadee, 3. Total, 5 species, 32 individuals.

Seen during the month of December: Downy Woodpecker (subsp.?), on the 12th; American Rough-legged Hawk, on the 13th; Sage Hen, on the 18th; Eastern Goshawk, on the 20th; Eastern Snow Bunting (2), on the 26th; Golden Eagle, on the 29th; Horned Owl (subsp.?), on the 31st; Bohemian Waxwing (20), on the 31st.

Subspecies determined geographically.—L. B. POTTER.

SUMMERLAND, OKANAGAN LAKE, BRITISH COLUMBIA, DECEMBER 23, 1934.—8.30 a.m. to 3.30 p.m. Northwesterly wind, strong in early a.m., dying to almost a calm in p.m. A fair day, partly cloudy at Summerland, but clear in morning at Penticton. Average temp., 34°. Snow on ground varied from six inches deep on the hills to none on lake-front. A short but furious snow flurry in a.m. in vicinity of West Summerland and benches. Area included: From Penticton to just north of Summerland (12 miles along lake-front), Penticton marshes and Summerland fruit benches, back to pine-clad hills. Observers separate.

Horned Grebe, 2; Common Mallard, 53; Barrow's Golden-eye, 4; Red-breasted Merganser, 2; Hawk (*Buteo borealis* (subsp.?)), 1; Marsh Hawk, 1; Pigeon Hawk (subsp.?), 1; European Partridge, 6; California Quail, 290; Ring-necked Pheasant, 57; Virginia Rail, 1; American Coot, 557; Killdeer, 5; Wilson's Snipe, 2; Herring Gull, 29; Short-eared Owl, 2; Belted Kingfisher (subsp.?), 2; Red-shafted Flicker, 44; Woodpecker (*Dryobates villosus* (subsp.?)), 2; Black-headed Jay, 2; American Magpie, 120; Northern Raven, 2; Western Crow, 1; Long-tailed Chickadee, 53; Mountain Chickadee, 8; Slender-billed Nuthatch, 6; Red-breasted Nuthatch, 3; Black-eared Nuthatch, 6; Western Marsh Wren, 2; Western Golden-crowned Kinglet, 4; Northwestern Shrike, 2; English Sparrow, 60; Western Meadowlark, 2; Red-wing (*Agelaius phoeniceus* (subsp.?)), 45; Pine Grosbeak (subsp.?), 4; Redpoll (sp?), 108; Shufeldt's Junco, 425; Western Tree Sparrow, 5; Rusty Song Sparrow, 51. Total, 39 species, 1970 individuals.—S. A. LIDDELL, S. J. DARCUS, H. M. SIMPSON, E. M. TAIT.

CULTUS LAKE NEAR CHILLIWACK, BRITISH COLUMBIA, DECEMBER 27, 1934.—Weather clear with a few cirrus clouds, light east wind, freezing. Lake not frozen. Eight inches of snow on the ground.

Observations made along ¼ mile of lake shore during morning, and along the Indian Reserve road to Vedder Crossing in afternoon, returning by the main road. Seven miles on foot.

Horned Grebe, 1; Northwestern Coast Heron, 1; American Golden-eye, 2; American Coot, 40; Glaucous-winged Gull, 25; (unidentified Gulls, 500); Flicker (*Colaptes cafer* (subsp.?)), 1; Northern Red-breasted Sapsucker, 1; Gairdner's Woodpecker, 2; Steller's Jay, 2; Northwestern Crow, 20; Oregon Chickadee, 1; (unidentified Chickadees, 10); Dipper, 3; Wren (*Nannus*

hiemalis (subsp.?), 3; Seattle Wren, 2; Varied Thrush (subsp.?), 1; Western Golden-crowned Kinglet, 120; Northern Pine Siskin, 1; Oregon Towhee, 1; Oregon Junco, 30; Rusty Song Sparrow, 3. Total, 20 species, 770 individuals. Sub-specific determinations made by reference to geographical position.—M. T. CARDWELL, W. E. RICKER.

COURTENAY, VANCOUVER ISLAND, BRITISH COLUMBIA, DECEMBER 23, 1934.—9.00 a.m. to 4.30 p.m. At start frosty and clear and no wind, gradually clouding, and in afternoon rain and snow showers with south-east wind. Weather has been particularly mild all fall. Temp. around 40°. Through Courtenay around Park to Comox, from there to Goose Spit (Comox Harbour) along road and river and shore-line, back to Comox by road. Ten miles on foot. Observers together.

Lesser Loon, 7; Pacific Loon, 5; Holboell's Grebe, 10; Horned Grebe, 15; White-crested Cormorant, 5; Baird's Cormorant, 6; Northwestern Coast Heron, 5; Common Mallard, 500 ±; American Widgeon (Baldpate), 450 ±; Canvas-back, 6; Scaup Duck (Greater and Lesser), 600 ±; American Golden-eye, 300 ±;

Barrow's Golden-eye, 4; Buffle-head, 50 ±; White-winged Scoter, 2000 ±; Surf Scoter, 500 ±; Hooded Merganser, 1; American Merganser, 2; Red-breasted Merganser, 5; Sharp-shinned Hawk, 2; Northern Bald Eagle, 1; Black Pigeon Hawk, 1; California Quail, 1; Ring-necked Pheasant, 8; American Coot, 20; Wilson's Snipe, 2; Glaucous-winged Gull, 700 ±; Thayer's Gull, 1; Short-billed Gull, 300 ±; Western Belted Kingfisher, 7; Flicker (sp.?, all had red shafts), 17; Western Pileated Woodpecker, 1; Gairdner's Woodpecker, 1; American Raven, 55; Northwestern Crow, 300 ±; Chestnut-backed Chickadee, 15 ±; Red-breasted Nuthatch, 1; Wren (*Nannus hiemalis* (subsp.?), 2; Seattle Wren, 4; Northwestern Robin, 3; Pacific Varied Thrush, 2; Western Golden-crowned Kinglet, 12 ±; English Sparrow, 60 ±; Western Meadowlark, 25; Brewer's Blackbird, 50 ±; California Purple Finch, 3; Northern Pine Siskin, 100 ±; Oregon Towhee, 4; Oregon Junco, 50; Song Sparrow (subsp.?), 13. Total, 50 or 51 species (3 introduced), 6232 ± individuals.

The subspecies are assumed.

December 26, Audubon's Warbler. — THEED PEARSE, DAVID GUTHRIE.

NOTES AND OBSERVATIONS

CORRECTION.—In *The Canadian Field-Naturalist* for November, 1932 (vol. 46, p. 181-183), under the heading "Rare birds in the Montreal district", I gave what seemed to be a reliable sight record of the Field Sparrow (*Spizella p. pusilla*), a new bird for the district (p. 182). The following autumn I went out to collect specimens to substantiate the record and found, as indeed I had by that time guessed, that the "Field Sparrows" in question were young White-crowned Sparrows. Reading over the description of the bird as I gave it, I am surprised that someone with more experience of Canadian birds than myself did not detect the mistake, for the description of the bird seen is accurate. I take this opportunity of withdrawing my share of the record.

The other new record given there, the Ring-billed Gull (*Larus delawarensis*), was soon afterwards confirmed by a specimen (juv. female, 26 Sept. 1932), now in the collection of the National Museum of Canada at Ottawa. We have seen these birds regularly since that time during fall migration, the earliest date being Aug. 20, the latest Nov 12.—V. C. WYNNE-EDWARDS.

BEHAVIOUR OF THE GARTER SNAKE DURING THUNDERSTORMS.—From observations made during 1932 and 1933 on Garter Snakes (*Thamnophis sirtalis*) in captivity, I have come to the conclusion that thunder storms make them restless in a marked degree. If a snake may be said to be alarmed, this would best describe their actions. A crash of thunder—or perhaps the flash of lightning—would send them to the "den", and the next brought them out again to glide rapidly about, pushing aside stones, etc., apparently seeking to escape the storm.

One case in particular comes to mind. During the late afternoon of August 17th, 1933, a severe electric storm burst and I particularly watched its effect on the snakes. In one cage a number of them were very restless; in another was a large female alone, which tore round the cage twisting her head about in a strange manner. During the night this snake gave birth to eight young, of which seven were dead and one alive. Following this she seemed disinclined to move, refusing food, not even drinking, and remaining in one place all the time. This continued until the night of September 5th, when she gave

birth to 24 more young, all alive, after which the parent snake began to move about again and to eat as before.

The premature birth of the eight young, immediately following the thunderstorm, and the subsequent lethargy leave no doubt in my mind as to the state of alarm felt by snakes at such storms.

It would be most interesting to note if anyone else has made observations on the subject.—

H. MILNES.

DO PTARMIGAN MIGRATE BETWEEN ICELAND AND GREENLAND?—From the inexplicable disappearance of Ptarmigan every few years, many have conjectured that there might be a migration,

to Greenland and there have been some observations which appear to support this view. In the current issue of "Natturfræðingur" (The Naturalist), John Gudlaugsson says:

"About mid-December, 1919, I happened to be on Hellisheidi (Cavern Heath) west of Skalafell. It was frosty weather with snow on the ground. I heard above me the sound of wings and saw high in the air a flock of possibly a thousand or fifteen hundred Ptarmigan. I have never seen Ptarmigan fly that high before or since. They came from an easterly direction and were flying northwest. While they were in my sight they did not decrease their flying level."

* From Reykjavik daily "Morgunblaðid" as quoted in the Winnipeg weekly "Lögberg" of Feb. 15, 1934. Translated by Vilhjalmur Stefansson.

REVIEW

ON THE MINERALOGY OF SEDIMENTARY ROCKS. *A Series of Essays and a Bibliography.* By P. G. H. Boswell, O.B.E., D.Sc., F.R.S. 1933. Demy 8vo pp. X, + 393. Published by Thomas Murby and Co., London. Price 21/- net.

Since 1923, Prof. Boswell has written various reviews of our knowledge of the mineral composition of sedimentary rocks, together with useful abstracts of many important papers dealing with that subject. The value of these was quickly recognised, and it soon became apparent that their publication in book form would be fully justified. This has now been accomplished with such additions as bring *The Mineralogy of Sedimentary Rocks* thoroughly up to date. The book is a bibliography with over 100 abstracts, preceded by eleven chapters dealing, amongst other things, with a history of the study of sediments, the study of minerals which compose them (detrital minerals), the source and origin of sediments as indicated by their constituent minerals, sands, present day deep sea sediments, and the minerals of clays. Early in the book, the author comments on the fact that practically all the common minerals are constituents of sedimentary rocks rather than a relatively few minerals. In the chapter of the source of sediments is summarized work which has been carried out during the last ten years or so on the accessory minerals of igneous rocks, and the author shows how much investigations contribute to deciding the origin of specific sediments, and how far detrital minerals indicate whether a sediment is derived directly from a rock massif or from an older sediment. The list of authigenic minerals (exclusive of "ore minerals")

recorded in sediments is over 40—a total that may be somewhat surprising to many workers. In the chapter on clays, due recognition is given to American investigators for "the most notable advances in knowledge of clay-minerals in recent years". As *The Mineralogy of Sedimentary Rocks* deals with many problems of interest to the geologist, its appeal will in no way be restricted to those who specialise in detrital mineralogy. As always Prof. Boswell is most readable from start to finish. The bibliography takes the place of an author index, and six additional indexes give what every investigator in this subject wants, references to stratigraphical horizons, localities, minerals varieties, figured minerals in original papers, and technique; anything not included under any of these headings is given in a general index. In the preface, the author makes the practical (and complimentary) suggestion that as the task of compilation grows too great for one worker to undertake, it might well be carried on by the Journal of Sedimentation (Tulsa, Okla.), now in its third year. Should such a suggestion materialise, and if the Journal can do half as well in the future as Prof. Boswell has done in the past, it will perform a valuable service to geological science in general, and sedimentary petrologists in particular. Probably not one of the least interesting statements in the book is in the preface: "Some day, perhaps, these essays may be expanded into an interesting story....". Such is the wish of any who have studied the author's contributions to a subject which every year grows in academic and economic importance.—F.J.F.

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No. 3

THREE SPECIES OF *EUBRANCHIPUS* NEW TO CANADA

By M. S. FERGUSON

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DURING the past ten years very little has been done in Canada on the occurrence of the fairy shrimps of the genus *Eubbranchipus*. Early in 1921 Johansen (1921 a) published a comprehensive account of the larger freshwater crustacea from Canada and Alaska, one section of which was devoted to the *Euphyllopoda*. At that time, as Johansen states, only one species of the genus *Eubbranchipus* was known to occur in Canada. This was *E. gelidus* Hay (1889) and it had been reported from the provinces of Quebec, Ontario, Alberta and the Yukon Territory. After a recent critical study, Creaser (1930) decided that *E. gelidus* was a direct synonym of *E. bundyi* Forbes (1876), a view which was later confirmed by Van Cleave (1931). The fact that Forbes had failed to mention the peculiar lateral processes on the ninth and tenth trunk segments of the female led the Hays to erect a new species. This characteristic, it might be mentioned, has been considered by some to be of sufficient taxonomic importance to warrant the placing of this species *E. bundyi* in a separate genus, that of *Pristicephalus*.

Johansen in the fall of 1921 reported the occurrence in southern British Columbia of *Eubbranchipus vernalis* Verrill (1869), a form previously reported from Michigan, Illinois, Indiana, Pennsylvania, New York, New Jersey and Massachusetts. In this paper it will be shown that Johansen's identification of the British Columbia specimens no doubt was in error.

An investigation carried on by the writer during the past five years, and begun as part of an undergraduate problem at the University of Western Ontario in London, makes it possible for him to report four of the six known species of *Eubbranchipus* as occurring in Canada. Collections made around London resulted in the identification of two species, namely *E. bundyi*

and *E. vernalis*. Specimens of fairy shrimps received from the University of Manitoba have been identified as *E. ornatus* Holmes (1910). Others received from British Columbia have proved to be *E. oregonus* Creaser (1930).

Eubbranchipus bundyi has been collected by naturalists in the London district for several years, but no attempt at classification was made. These collectors report this species as being very common in shallow pools during March, April and May. In April of 1930 the writer made a search for this phyllopod near the city of St. Thomas, a distance of fifteen miles south of London. It was found in four ponds and one large flooded woodland area, all of which localities were close together. Since that time four additional ponds in this region have been found to contain *E. bundyi*.

As reported by previous writers the populations of this fairy shrimp vary greatly from year to year in the same ponds and also in ponds in close proximity to one another. In the writer's observations it is usual for a pond to be populated by only a single species. Only twice has he found *E. bundyi* in the same body of water with *E. vernalis*, the only other species known to occur in this district, and in each case the former was the more numerous.

On April 2, 1932, several specimens of *E. vernalis* were collected in a small but deep pool, one mile south of London. This was the first time to the writer's knowledge that this fairy shrimp had ever been collected in this locality and as will be shown later was doubtless a record for Canada. Johansen (1921 a), however, believed that this species should occur in Canada since it was fairly common from New England to Wisconsin, south of the international boundary line. This same year five additional and widely separated locations for *E. vernalis* were recorded for the London and St. Thomas

districts. It has been noted by the writer that *E. vernalis* seems to live only in temporary but fairly deep ponds. Such an environment seems necessary since the eggs of this species hatch in the fall after the first rains fill the ponds. Maturity is gradually attained under the ice during the winter. If the water were not sufficiently deep the ice might extend to the bottom and no doubt this species would perish as has been noticed in the case of *E. bundyi* on several occasions. From local observations *E. vernalis* would appear to be fairly common in south-western Ontario and to inhabit only deeper ponds, a characteristic which makes its occurrence more scattered.

In a letter received from Dr. E. P. Creaser of the University of Michigan in May, 1932, he stated that he had reasons to doubt the record of *E. vernalis* from British Columbia as reported by Johansen in the fall of 1921. He suspected that this species might be that of *E. oregonus* Creaser (1930) which he had described from specimens collected in northern Oregon. In October, 1933, a series of specimens was received by the writer from Mr. T. L. Thacker of Little Mountain, Hope, B.C. (who had also supplied Johansen with the British Columbia fairy shrimps in 1921). All collections were made from November, 1932, to May, 1933, near Little Mountain on the east side of the Fraser River with the exception of one, which was made on the west side. The fairy shrimps were reported by Thacker as being much more common on the east side of the river.

The eggs of *E. oregonus*, like those of *E. vernalis*, hatch in the fall after the rains have filled the temporary ponds. The adult males of *E. oregonus* average about 15 mm. in length while those of *E. vernalis* average about 23 mm. These two species cannot be easily confused on account of marked differences in the following characteristics of the males: the frontal appendages, the second antennæ and the length of the body. Since the fairy shrimps identified by Johansen as *E. vernalis* were collected by Thacker and since no subsequent report of this species has been made from western Canada or the western United States, the writer assumes that Johansen's identification was in error, possibly due to the fact that he failed to notice the characteristics which have since been considered of sufficient importance to warrant the erection of a new species.

Recently (November, 1933) two lots of fairy shrimps were received from Professor Ferris Neave of the University of Manitoba. These

were identified as *E. ornatus* Holmes (1910), a species known to occur in Wisconsin and Minnesota. This is a species measuring on the average about 12 mm. in length and in life is of a beautiful bluish green coloration. According to Holmes (1910) these fairy shrimps live for only a few weeks in the spring. This characteristic is similar to that of *E. bundyi*, a form with which they are sometimes associated in the same pond. Professor Neave states, "*Eubranchipus* is abundant in spring in many ditches, temporary ponds, etc., near Winnipeg." Since *E. bundyi* is found in Wisconsin and has also been reported from Alberta it is reasonable to expect that it, as well as *E. ornatus*, may occur in Manitoba. Probably it is to one or both of these species that Professor O'Donoghue of the University of Manitoba referred when he wrote to Johansen in June, 1920: "... a species of *Branchipus* or more probably an *Eubranchipus* is fairly common all around Winnipeg on both sides of the Red and Assiniboine Rivers, as a rule in the pools formed where the snow melts....".

It is rather doubtful if the two remaining species of this genus, *E. serratus* and *E. neglectus* will ever be found in Canada. *E. neglectus* Garman (1926) has been reported by Garman as occurring only in the Bluegrass regions of Kentucky and to be approaching extinction due to changed conditions. *E. serratus* Forbes (1876) has been collected in the states of Illinois, Nebraska and Missouri; possibly it may occur farther north of this area.

A survey of the above notes would indicate that *Eubranchipus bundyi* is the only species found more or less commonly in Canada and in the northern half of the United States. The remaining species appear to be distributed over this territory in certain regions, according to latitude. In this connection the writer wishes to state that he has considerable data on the ecology of the two local species and that he hopes to present these in the near future.

The writer wishes to acknowledge the valuable assistance given him by Dr. J. D. Detwiler, Department of Applied Biology of the University of Western Ontario, in the direction of this investigation. Credit is due to Dr. E. P. Creaser of the University of Michigan for the checking of specific identifications and other information. The writer further wishes to thank the following for supplying specimens: Mr. T. L. Thacker and family, for nineteen lots of the British Columbia species, *E. oregonus*; Professor Ferris Neave

for two lots of the Manitoba species, *E. ornatus* and Mr. Vernon Franks of the University of Western Ontario for collections of the local species, *E. vernalis* and *E. bundyi*.

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* Reference to the older literature may be found in Creaser, 1930.

LIST OF THE VASCULAR PLANTS OF THE HORSETHIEF CREEK-- PURCELL RANGE, B.C.

By TITUS ULKE, Ph.D.



HIS CHECK-LIST is based on plant-collections made by the writer in 1928, and now in the herbaria of the Catholic University, Brookland, D.C., and of Toronto University, Toronto, Canada. Observations as to prevalence and habitat of each species collected are included. Altogether the names of 405 species are enumerated.

OPHIOGLOSSACEAE

Botrychium lunaria (L.) Swartz

Occasional; in wet grassy meadows bordering the Creek at middle to high altitudes.

POLYPODIACEAE

Woodsia glabella R. Br.

Rare; in crevices of shale rock above Lake of the Hanging Glaciers at 2700 m. alt.

Cryptogramma acrostichoides R. Br

Rare; on calcareous slopes of the Purcell Range at middle to high elevations.

Filix fragilis (L.) Underw.

Not uncommon; in crevices of calcareous shale at middle elevations.

Dryopteris dryopteris (L.) Christ.

Locally abundant; under spruces in rich soil at low to middle elevations.

Dryopteris dilatata (Hoffm.) Gray.

Occasional; under spruces in rich soil at 2000 m. alt.

Polystichum lonchitis (L.) Roth.

Occasional; in moist woods at middle to high elevations.

Asplenium viride Huds.

Common; in crevices of quartzitic rock above Lake of the Hanging Glaciers at 3000 m. alt.

EQUISETACEAE

Equisetum variegatum Schl.

Occasional; in clumps in moraine sands below Starbird Glacier at 2000 m. alt.

Equisetum palustre L.

Occasional; in gravel flats along the Creek at 1300 m. elev.

Equisetum scirpoides Mich.

Occasional; in mossy soil under shrubs at 1300 m. altitude.

LYCOPODIACEAE

Lycopodium alpinum L.

Uncommon; in shaded rich soil along the Creek at 1900 m. alt.

Lycopodium complanatum L.

Locally abundant; along grassy edge of forest at 1300 m. alt.

Lycopodium annotinum L.

Common; along wood trails in the Creek valley at 1800 m. alt.

SELAGINELLACEAE

Selaginella Standleyi Maxon.

Rare; on dry shale slopes at high elevations.

Selaginella selaginoides (L.) Link.

Occasional; under shrubs on mossy bank of Creek at 1900 m. elev.

TAXACEAE

Taxus brevifolia Nutt.

Rare; on rocky slopes at middle altitudes.

PINACEAE

Pinus albicaulis Engelm.

Common about timberline.

Pinus contorta latifolia (Engelm.) S. Wats.

Locally abundant at mouth of Horsethief Creek at 1000 m. alt.

Pinus flexilis James.

Rare; on exposed slopes and near mountain tops.

Larix occidentalis Nutt.

Occasional; near the Starbird Ranch, at 1350 m. alt.

Larix Lyallii Parl.

Rare; about timberline.

Picea canadensis (Mill.) B. S. P.

Frequent; at middle altitudes and in the low valleys.

Picea Engelmanni (Parry) Engelm.

Abundant; forming forest stands at 1300 to 2500 m. elev.

Abies lasiocarpa (Hook.) Nutt.

Abundant; at 1700 to 2600 m. alt.

Pseudotsuga mucronata (Raf.) Sudw.

Occasional; near Starbird Ranch at 1350 m. alt.

Tsuga heterophylla (Raf.) Sargent.

Occasional; near Starbird Ranch at 1350 m. elev.

Tsuga mertensiana (Bong) Carr.

Occasional; on exposed slopes in the Purcell's.

Thuja plicata Don.

Not uncommon; near Starbird Ranch at 1350 m. elev.

Juniperus communis L. var. *montana*.

Occasional; on dry slope near junction of Horsethief and Gopher Creeks.

Juniperus occidentalis Hook. var. *horizontalis*.

Occasional; on dry stony slopes at 1500 m. alt.

POTAMOGETONACEAE

Potamogeton amplifolius Tuckerm.

Rare; in ponds at low elevation.

Potamogeton Richardsonii A. Benn.

Rare; probably in slow streams and ponds.

SCHEUCHZERIAEAE

Scheuchzeria palustris L.

Rare; in bogs at low altitude.

Triglochin palustris L.

Rare; in boggy places at low altitude.

ALISMATACEAE

Alisma brevipes Greene.

Rare; in low places.

GRAMINEAE

Phalaris canariensis L.

Occasional; about dwellings at Wilmer.

Phalaris arundinacea L.

Occasional; in wet soil at low alt.

Torresia odorata (L.) Hitchc.

Rare; in sphagnum at 2000 m.

Oryzopsis asperifolia Michx.

Occasional; on dry gravelly slopes at 1700 m. elev.

Phleum alpinum L.

Common; in meadows above timberline.

Agrostis humilis Vasey.

Not uncommon; in wet meadows at 1300-1700 m. elev.

Calamagrostis canadensis (Michx.) Beauv.

Occasional; in boggy ground at 2600 m. alt.

Calamagrostis inexpansa A. Gray.

Occasional; in swampy meadow at 1950 m. elev.

Deschampsia (*Aira*) *atropurpurea* (Wahl) Scheele.

Not uncommon; on open slope at 2000 m. alt.

Trisetum spicatum (L.) Richter.

Locally abundant; on shale slope of Mt. Thompson at 2350 m. elev.

Kæleria cristata (L.) Pers.

Occasional; on open slope at about 1650 m. alt.

Avena sativa L.

Common; along road to Starbird Ranch.

Danthonia intermedia Vasey.

Rare; near mouth of Horsethief Creek.

Poa alpina L.

Common; above timberline and along brooklets lower down in the valleys.

Poa interior Rydb.

Rare; in meadow near the Starbird Ranch.

Poa reflexa Vasey & Scribn.

Not uncommon; in wet sandy soil at about 2160 m. alt.

Poa Wheeleri Vasey.

Rare; on higher slopes.

Poa epilis Scribn.

Rare; in meadows above timberline.

Poa gracillima Vasey.

Rare; at or near timberline.

Festuca ovina L.

Rare; at 2300 m. elev.

Festuca brachyphylla Schult.

Rare; on calcareous shale above timberline.

Bromus pumpellianus Scribn.

Rare; near the Starbird Ranch.

Bromus Richardsonii Link.

Occasional; at border of woods near the Starbird Ranch.

Agropyron violaceum (Hornem.) Lange.

Rare; in alpine meadow at 2300 m. elev.

Triticum aestivum L.

Common; along trail near the Starbird Ranch.

Hordeum jubatum L.

Very common; in meadowland about Wilmer

Elymus innovatus Beal.

Occasional; along road near the Starbird Ranch.

CYPERACEAE

Eriophorum chamissonis Mey.

Common; in bogs at low altitudes.

Dulichium arundinaceum (L.) Britton.

Rare; in sphagnum bogs.

Carex Halleri (alpina) Gunn.

Locally abundant; on rocky slope of Mt. Thompson at 2600 m. elev.

Carex arcta Boott.

Occasional; in wet thicket at 1500 m. alt.

Carex aurca Nutt.

Frequent; in wet meadows at 1300-1700 m. elev.

Carex Bebbii Olney.

Rare; on sandbar at middle elevation.

Carex atrata L.

Common; in grass-covered shaly soil at 2600 m. alt.

Carex capillaris L.

Occasional; on rocky bench at 2600 m. elev.

Carex limosa L.

Rare; in sphagnum at low altitude.

Carex nigricans C.A. Meyer.

Not common; along bank of Creek at 2000 m. elev.

Carex viridula Michx.

Rare; on sandy flat near mouth of Creek.

Carex petasata Dewey.

Occasional; in alpine meadow at 2600 m. alt.

Carex spectabilis Dewey.

Abundant; along swampy border of Creek at 1900 m. elev.

Carex rostrata Stokes.

Abundant; in wet meadows at 2000 m. alt.

Carex scirpoides Michx.

Occasional; on shale soil at about 2650 m. elev.

Carex scopulorum Holm.

Rare; on slopes at high elevation.

Carex concinna R. Br. ..

Occasional; in rich soil near the Starbird Ranch.

Carex pratensis Dreher.

Occasional; on sandy bar at 2300 m. elev.

Carex vaginata Tausch.

Rare; in rich soil near the Starbird Ranch.

JUNCACEAE

Juncus balticus Willd.

Occasional; in wet meadows at 2000 m. elev.

Juncus subtriflorus (Drummondii) (Mey) Coville.

Not uncommon; in dense clumps on dry slope below Hanging Glaciers Lake.

Juncus mertensianus Bong.

Occasional; in mountain meadow at 3000 m. alt.

Juncus Richardsonianus Schult.

Common; in wet meadow at 1000 m. elev.

Juncus saximontanus A. Nels.

Occasional; in wet meadows at low elevations.

Luzula parviflora Ehr.

Common; along border of woods at 1000 m. elev.

Luzula Piperi Coville.

Rare; along border of open woods at 1000 m. alt.

Luzula spicata DC.

Occasional; growing below the Lake of the Hanging Glaciers.

Luzula intermedia (Thuill.) A. Nels.

Common; at 2000-2500 m. elev.

LILIACEAE

Stenanthium occidentale A. Gray.

Frequent; in meadows at 1000-2000 m. alt.

Tofieldia intermedia Rydb.

Abundant; in wet meadows and along brooks at high elevations.

Tofieldia palustris Huds.

Frequent; along rocky banks of brooks at middle to high elevations.

Zygadenus elegans Pursh.

Common; in woods and meadows at middle and high altitudes.

Zygadenus paniculatus S. Wats.

Rare; near Wilmer.

Veratrum viride Ait.

Occasional; in moist thickets or meadows at 2000-3000 m. elev.

Allium cernuum Roth.

Common; in moist alpine meadows at about 2000 m. alt.

Erythronium grandiflorum Pursh.

Frequent; on wet slopes at 2000-2500 m. elev.

Clintonia uniflora (Schult.) Kunth.

Common; in deep moist woods at 1000-2000 m. elev.

Vagnera stellata (L.) Morong.

Occasional; in moist woods at low and middle elevations.

Vagnera racemosa (L.) Morong.

Occasional; at low and middle altitudes.

Streptopus amplexifolius (L.) DC.

Frequent; in moist thickets and woods at 1000-2500 m. elev.

Disporum trachycarpum S. Wats.

Frequent; in thickets and moist woods at 1000-2000 m. alt.

Calochortus elegans Lindl.

Infrequent; about Wilmer.

Lilium montanum A. Nels.

Occasional; in sandy soil near Creek at 1500 m. elev.

IRIDACEAE

Sisyrinchium mucronatum Michaux.

Occasional; on moist unshaded bank at low elevation.

ORCHIDACEAE

Corallorhiza multiflora Nutt.

Occasional; in deep moist woods at low elevations.

Corallorhiza corallorhiza Karst.

Occasional; along border of woods at low elevations.

Ophrys convallarioides (Sw.) F. W. Wright

Occasional; on shaded banks of bogs at 2000-2500 m. elev.

Ophrys cordata L.

Occasional; in moist woods under shrubs at 2000-3000 m. alt.

Cytherea bulbosa (L.) House.

Infrequent; in deep shaded moss under Engelmann spruces at 2000-3000 elev.

Epipactis decipiens Ames.

Occasional; on shaded banks in rotting pine needles at 1500 m. elev.

Epipactis ophioides A. A. Eaton.

Rare; on shaded banks among pine needles at 1500 m. alt.

Spiranthes romanzoffiana Cham.

Infrequent; in sphagnum moss or wet thickets at low altitudes.

Habenaria obtusata (Pursh) Richards.

Occasional; on mossy banks in wet woods at low elevations.

Habenaria bracteata (Willd.) R. Br.

Very rare; along the Creek in wet woods at about 1000 m. alt.

Habenaria dilatata (Pursh) Hook.

Common; in bogs or wet woods at 1000-3000 m. elev.

Habenaria stricta (Lindl.) S. Wats.

Common; in bogs or wet woods at 1000-3000 m. alt.

Habenaria unalaschensis (Spreng.) S. Wats.

Very rare; at middle to high altitudes.

Orchis rotundifolia Pursh.

Abundant locally; on mossy banks at 1500-2000 m. alt.

Cypripedium parviflorum Salisb.

Occasional; on calcareous slopes and in rich woods at about 1500 m. elev.

Cypripedium passerinum Richards.

Infrequent; at edges of moist meadows, under willows, at 1500 m. elev.

SALICACEAE

Populus aurea Tidestrom.

Occasional; at middle elevations.

Populus trichocarpa T. & G.

Common; along stream at low altitude.

Salix anglorum Cham.

Frequent; in alpine meadows at high elevations.

Salix barrattiana Hook.

Abundant; in extensive dense clumps at about 2500 m. alt.

Salix bebbiana—*perrostrata* (Rydb.) C. Schneid.

Occasional; at low altitudes.

Salix brachycarpa Nutt. var. *Sansoni* Ball.

Rare; in alpine meadow at 2500 m. elev.

Salix commutata Bebb.

Occasional; in alpine meadows at 1500-2500 m. alt.

Salix nivalis Hook.

Abundant; forming extensive carpets above timberline.

Salix drummondiana Barr. var. (or a new sp.).

Occasional; on alpine slopes at 1500-2000 m. alt.

Salix vestita Pursh.

Abundant; on moist slopes at high elevations.

Salix vestita erecta Anderss.

Abundant; on moist slopes at high altitudes.

BETULACEAE

Betula glandulosa Michx.

Frequent; in bogs and along streams at 1000-3000 m. alt.

Betula papyrifera Marsh.

Common; along streams at low and middle altitudes.

Betula occidentalis Hook.

Occasional; along the Creek at 1000 m. elev.

Alnus sinuata (Regel) Rydb.

Frequent; along streams and moist woods at 1000-2000 m. alt.

Alnus tenuifolia Nutt.

Occasional; at lower elevations.

URTICACEAE

Urtica Lyallii S. Wats.

Infrequent; in moist woods or thickets at 1000-2000 m. elev.

LORANTHACEAE

Razoumofskya americana (Nutt.) Kuntze.

Rare; parasitic on lodge pole pine at low altitudes.

SANTALACEAE

Comandra livida Richards.

Common; in rich woods at low altitudes.

POLYGONACEAE

Eriogonum subalpinum Greene.

Common; on open hillsides.

Polygonum bistortoides Pursh.

Common; in moist meadows above timberline.

Polygonum Douglasii Greene.

Occasional; on open brushy slopes at 1000 m. alt.

Polygonum convolvulus L.

Occasional; in waste ground at 900 m.

Polygonum viviparum L.

Frequent; in wet meadows and on rock-slides above timberline.

Rumex crispus L.

Occasional; in waste ground at low altitude.

Oxyria digyna (L.) Hill.

Abundant; on slopes and rocks slides above timberline.

CHENOPODIACEAE

Chenopodium album L.

Frequent; along the trails at about 1000 m. elev.

Chenopodium capitatum (L.) Aschers.

Occasional; along the pack trail at 1200 m. alt.

PORTULACACEAE

Claytonia lanceolata Pursh.

Infrequent; on grassy slopes at middle elevations.

Claytonia megarrhiza (A. Gray) Parry.

Occasional; on mud slides on east slope of the Purcell's at 3000 m. elev.

CARYOPHYLLACEAE

Lychnis apetala L.

Infrequent; on the highest rock slides above timberline.

Lychnis Drummondii (Hook.) S. Wats.

Occasional; in alpine meadows at high elevations.

Silene acaulis L.

Common; in meadows and on rock slides above timberline.

Stellaria lata Richards.

Occasional; on open rocky slopes at high elevations.

Stellaria borealis Bigel.

Not common; at low to high altitudes.

Cerastium alpinum var. *beeringianum* (L.) Cham. & Schlecht.

Rare; in a moist meadow below Hanging Glaciers Lake.

Cerastium strictum L.

Common; in moist meadows above timberline, also at low altitudes.

Arenaria formosa Fisch.

Abundant; on rock slides or in meadows above timberline.

Arenaria sajanensis Willd.

Occasional; in alpine meadows at 2500 m. elev.

Arenaria propinqua Richards.

Frequent; on banks of brooks or on rock slides at high altitudes.

Mæhringia lateriflora (L.) Fenzl.

Infrequent; in moist thickets at 1000-2000 m. elev.

Paronychia Jamesii T. & G.

Rare; in dry soil near Wilmer.

RANUNCULACEAE

Clematis columbiana (Nutt.) T. & G.

Occasional; in aspen thickets or moist woods at 1000-2000 m. elev.

Actæa rubra (Ait.) Willd.

Common; in moist woods and thickets at low and middle altitudes.

Delphinium reticulatum A. Nels.

Frequent; in moist thickets at middle elevations.

Delphinium Menziesii DC.

Common; on grassy slopes at about 2000 m. elev.

Aquilegia flavescens, S. Wats.

Common; at middle and high altitudes.

Aquilegia brevistyla Hook.

Rare; along stream and meadow near mouth of Creek.

Trollius albiflorus (A. Gray) Rydb.

Common; in wet meadows near timberline.

Caltha leptosepala DC.

Infrequent; in mossy bogs and along brooks at high altitudes.

Batrachium grayanum (Freyn.) Rydb.

Rare; floating in pond 3 miles beyond Starbird Ranch.

Ranunculus Escholtzii Schlecht.

Occasional; at edge of snow in alpine meadows.

Ranunculus cymbalaria Pursh.

Frequent; in wet mud at low and middle elevations.

Ranunculus inamænus Greene.

Rare; in moist open ground at 2000-3000 m. elev.

Ranunculus Macounii Britton.

Common; on edges of moist meadows at 1000 m. alt.

Ranunculus Purshii Richards.

Occasional; at edge of pool in a wet meadow at 1500 m. elev.

Ranunculus sceleratus L.

Not common; in swampy ground along the Creek at 1600 m. elev.

Thalictrum occidentale A. Gray.

Occasional; on brushy slopes at low and middle elevations.

Pulsatilla ludoviciana (Nutt.) Heller.

Not common; on grassy slopes at 2000 m. elev.

Pulsatilla occidentalis (S. Wats.) Freyn.

Occasional; in alpine meadows at 2000 m. alt.

Anemone globosa Nutt.

Frequent; on rocky slopes at low to high elevations.

Anemone Drummondii S. Wats.

Common; near the snow at high elevations.

Anemone parviflora Michx.

Frequent; in alpine meadows at 2500 m. elev.

BERBERIDACEAE

Berberis repens Lindl.

Infrequent; at 1300 m. elev.

FUMARIACEAE

Corydalis aurea Willd.

Occasional; on brushy hillside at 1000 m. alt.

CRUCIFERAE

Thlaspi arvense L.

Common; near Wilmer.

Capsella bursa-pastoris Medic.

Frequent; about fields and in waste places at low altitudes.

Norta altissima (L.) Britton.

Infrequent; in waste places about Wilmer.

Arabidopsis novæ-angliae (Rydb.) Britton.

Rare; on rocky slope at 2500 m. alt.

Sophia gracilis Rydb.

Occasional; on open slopes near Wilmer.

Smelowskia americana Rydb.

Rare; at 3100 m. alt. on Mt. Thompson.

Cheirinia cheiranthoides (L.) Link.

Frequent; near Wilmer.

Brassica juncea (L.) Cosson.

Occasional; near Wilmer.

Cardamine cordifolia Gray.

Occasional; on wet bank of Creek at 1800 m.

Cardamine parvifolia L.

Infrequent; in dryish soil at 1000-2000 m. elev.

Draba cana Rydb.

Occasional; border of wet meadow at 2800 m. alt.

Draba aurea Vahl.

Frequent; in woods at 1500-2000 m. elev.

Draba glacialis Adams.

Rare, on rocky slope of Mt. Dome at 3000 m. alt.

Draba nemorosa L.

Occasional; in moist woods at 1000 m. elev.

Draba oligosperma Hook.

Rare; on moraine of Mt. Thompson at 2800 m. elev.

Draba lonchocarpa Rydb.

Occasional; above timberline on moraines and rocks slides.

Draba prealta Greene.

Very rare; rocky slope of the Purcell's at 2500 m. elev.

Arabis Bourgovii Rydb.

Frequent; in meadows and on rocky hill-sides at 1000-2000 m. alt.

Arabis Ljallii S. Wats.

Occasional; at 2000 m. elev.

Arabis Nuttallii.

Frequent; along sandy borders of woods at 1000-2000 m. elev.

CRASSULACEAE

Sedum stenopetalum Pursh.

Common; on open rocky slopes at 1000-3000 m. alt.

Rhodiola integrifolia Raf.

Occasional; on stony slopes at 2000 m. elev.

SAXIFRAGACEAE

Parnassia fimbriata Konig.

Common; along streams and bogs at 2000 m. alt.

Parnassia Kotzebui Cham.

Occasional; along edges of brooks at 2500 m. elev.

Parnassia montaniensis Fern. & Rydb.

Infrequent; on banks of wet meadows at 1000 m. alt.

Mitella violacea Rydb.

Rare; on open slope at 2500 m. elev.

Mitella nuda L.

Common; on mossy banks at 1000 m. elev.

Mitella pentandra Hook.

Common; at 1000-3000 m. alt.

Mitella Brewerii A. Gray

Abundant; in woods or on open slopes above and near timberline.

Suksdorfia violacea A. Gray.

Very rare; on a wet mossy cliff near main camp at 2200 m. elev.

Heuchera ovalifolia Nutt.

Occasional; in rocky places.

Heuchera glabella T. & G.

Common; on cliffs or in rocky places at 1000-2000 m. elev.

Tiarella unifoliata Hook.

Common; in moist woods at 1000 m. alt.

Leptarrhena pyrolifolia (Don) R. Brit.

Abundant; along brooks and in wet meadows at 2000-2500 m. elev.

Saxifraga adscendens L.

Occasional; on moist rock on slope of Mt. Thompson.

Saxifraga punctata L.

Occasional; at 2700 m. elevation.

Saxifraga autumnalis L.

Frequent; on shingle flats at 1200 m. elev.

Saxifraga bronchialis L.

Frequent; at 2500 m. on Mt. Thompson, and on rocky slopes at 2000 m.

Saxifraga caespitosa L.

Rare; on moist rock at 2500 m. elev. on Mt. Thompson.

Saxifraga cernua L.

Occasional, along wet rills and slide rock at 2000-3000 m. alt.

Saxifraga Ljallii Engl.

Occasional; at 2700 m. elev.

Saxifraga rhomboidea Greene.

Occasional; in wet meadows at 2000 m. elev.

Saxifraga oppositifolia L.

Not infrequent; on crest of divide at 3000 m. near Mt. Thompson.

Ribes lacustre (Pers.) Poir.

Occasional; from middle elevations up to timberline.

(To be concluded)

BIRD NOTES FROM VANCOUVER ISLAND, 1933

By HAMILTON M. LAING



THE YEAR 1933 brought some additional bird notes to the Vancouver Island list that are worthy of record. April 21, 22 and 23 were spent on an expedition up the Oyster River in quest of the breeding form of *Branta canadensis*. On the evening of April 21st a pair was found in a swamp on Caribou Creek—this a tributary of the Oyster—the female already incubating five eggs in a nest on an old beaver house in a vacated dam. Next day both geese and the nest were collected, these birds proving as expected, the large, brownish form of Canada goose or as understood by the writer *Branta c. occidentalis*, White-cheeked Goose.

The deep snow of the winter of '32-'33, followed by a late spring, was responsible apparently for some changes in nesting of local birds. Juncos (*Junco o. oreganus*) that usually take to the hills to breed remained commonly in the burns and slashings near sea level. Similarly the Varied Thrush (*Ixoreus n. naevius*) bred within a stone's throw of salt water, two young just from the nest being taken on my place at Comox, May 8. This is the first time they have been observed nesting here so low.

The first two weeks of July spent at the extreme northerly end of the Island in the vicinity of Cape Scott established somewhat unsatisfactorily the breeding there of the Ruby-crowned Kinglet. Each spring, early, Ruby-crowns, mainly, if not entirely *Corthylio calendula grinnelli*, pass through Comox, always in fine song, to disappear until late autumn. The muskegs of the north end of the Island may give the answer. On July 11 a very immature bird, apparently recently from the nest came to my owl call and was secured, though no sign of parent could be found then or at any other point.

Better fortune attended a quest on the tide flat at Cape Scott, July 10, for Savannah Sparrows, when of a pair found, a male in good feather was secured. This bird is of the very small race, apparently identical with specimens in the writer's collection from the Fraser delta (Huntingdon) formerly designated *Passerculus s. brooksi*. Undoubtedly this is the same form known to nest at Cowichan, Vancouver Island, and once previously taken in song at Seal Island in the Comox area (May 5, 1931). The Cape Scott specimen, in breeding condition, would seem to be the northerly record of this form of *Passerculus* to date.

Two new owls established themselves as local breeders during the season. On August 4, E. M. Laing discovered a young Saw-whet Owl at the creek beside the garden. When secured, it proved exceedingly juvenile, and a cripple as well, ruling out any lengthy journey. One eye was missing and the beak badly mutilated, the mandibles crossed at a wide angle. Plainly the youngster was dependent on his parents, though these were not seen or heard here during the summer. This specimen was identified by Taverner as *Cryptoglaux acadica acadica*.

On the 28th of August, John Pritchard, of Comox, presented the writer with a specimen of the Long-eared Owl, *Asio wilsonianus*, a juvenile he had taken at the McBain's swamp, seven or eight miles inland in the region of slashings and burns adjoining the Oyster River. As he reported seeing three of these hunting in the evening, it is quite a certainty that this Owl, taking advantage of the passing of the heavy timber, has decided to become a breeder if not a resident.

In regard to the nesting of the Sandhill Crane on Vancouver Island as reported previously in *The Canadian Field-Naturalist* (Vol. 46 Nov. 1932.) it is a pleasure to be able to record that the species still is holding to old haunts. On October 5 while deer-hunting near Lower Quinsam Lake, four Cranes were observed winging in the direction of the former nesting swamp. Two of them were plainly juveniles—even in the matter of their voices as they were still in the whistling stage unable to emulate the croak of the parent. The lateness of these young suggested a second nesting, as normally the young of this species are as far advanced as this by mid-August or September first.

In late November for some days the pursuit of crows offered some excitement. While deer-hunting up the Tsolum River, seven or eight miles inland from salt water, a flight of crows was observed at daybreak to come winging in high to drop to a small tributary creeklet. The call notes of most of these birds marked them as, not the common resident but, the Western Crow of the interior—*Corvus b. hesperis*. These birds were very wary, schooled in the ways of gunners and the getting of specimens necessitated three very early morning expeditions. Two birds however were secured, a male, December 8, and female, November 29, both in measurements

decidedly beyond the limits of the resident North-western Crow, *Corvus b. caurinus*. In the flesh the adult female measured eighteen inches, the wing a shade under twelve inches, the adult male about the same, wing twelve and a quarter inches. Both birds were fat, the male exceedingly so, suggesting that this flock came either from a feeding ground in the yellow pine country—on the seeds of which tree they feed commonly in the southern interior (or from grain-fields. The beach-combing *Corvus b. caurinus* never is able to put such a coating of yellow tallow below his skin. As crows as a rule do not go to their watering-place first thing in the morning the purpose of this dawn flight was not plain, but probably it was to pick up scraps of salmon left on the bank by

the bears at work on the fish during the night. Usually there were plenty of these, though not enough to feed three or four hundred crows. Where the day feeding-ground of this flock was located was not determined even by search of considerable mileage across the valley farm lands.

The above is not the first sight record by the writer of *Corvus b. hesperis* on Vancouver Island though in this case such record is a record by sound. The voices of these two crows may be distinguished quite definitely. Indeed there is so much difference in voice and habits as well as in size between *Corvus b. caurinus* and *Corvus b. hesperis* as to suggest that the maritime bird (*caurinus*) might well have been left in his former status as a distinct species.

SOME 1932 BIRD NOTES FROM LONDON, ONTARIO

By E. M. S. DALE



THE YEAR 1932 produced a number of very interesting items in the London district, including two new birds for the county. Particulars of a number of these have already appeared in print either in *A History and List of the Birds of Middlesex County* (Saunders and Dale 1933) or the columns of *The Canadian Field-Naturalist*. The following summary will, therefore, deal largely with those an account of which has not yet been published, passing reference only being made to the others.

The year began, on January 9th, with the sight record of a White Gyr Falcon (*Falco rusticolis candicans*) by W. E. Saunders. *

This was followed on January 10th by our first winter warbler record, a Nashville (*Vermivora ruficapilla ruficapilla*) rather an unusual species to be found in northern latitudes at this season of the year.*

A third item of interest for January was an Eastern Mocking-bird (*Mimus polyglottos polyglottos*) on the 24th, discovered by Eli Davis near Byron. There are two other records prior to this of winter Mockingbirds from the London district.

On March 25th (Good Friday) three of our club members (Saunders, Davis and Dale) were crossing Byron bridge on the way to Wonnacott's farm when attention was called to a bird standing on the ice just east of the bridge. It proved to be a Blue Goose (*Chen caerulescens*), the second record for the county.*

Lack of suitable territory for waders in the immediate vicinity of London makes these birds of special interest to students from the city and each spring trips are taken to Rondeau, Long Point and Ipperwash Beach for the purpose of renewing acquaintance with some of the rarer species which usually pass our district by. It is with peculiar pleasure, therefore, that we report a Hudsonian Curlew (*Phaeopus hudsonicus*) observed near Thorndale on May 10th, by Mr. and Mrs. E. H. McKone. This is our third record for the species, only one bird on each occasion.

A Blue-winged Warbler (*Vermivora pinus*) was taken by A. A. Wood near Strathroy, on May 16th. This is the first record for the county and one of the few records for this bird for Canada.†

On July 15th Mr. Wood reported another interesting bird, a Clay-coloured Sparrow (*Spizella pallida*) about ten miles north-west of London. It was living in the front yard of a farm house, rather an unusual place for a "Clay-colour" to locate. It remained for some weeks and was seen by other members of the Bird Club.

One of our rarest owls is the Saw-whet (*Cryptoglaux acadica acadica*). In the night of July 31st, J. C. Higgins, who has a farm at

* *A History and List of the Birds of Middlesex County, Ontario*, Saunders and Dale, 1933.

† *The Canadian Field-Naturalist*, 48:58, March, 1933.

Melrose, was awakened by Killdeer. Securing a flash-light he went out into the garden to see what might be causing the disturbance. There he discovered a Saw-whet Owl sitting on a stake that marked the end of a row of peas. He got to within three or four feet of the sitting bird and shone the flash-light upon it. He is quite familiar with the Screech Owl (*Otus asio navius*) and, in addition, is one of the few members of the Bird Club who have seen the Saw-whet in life, having taken a specimen a few years ago. It is quite possible it may have nested in the vicinity as there are suitable places for it to do so on the Higgins farm.

Other species noted during the year but which do not, perhaps, require any particular comment, follow:

WHISTLING SWAN (*Cygnus columbianus*).—One on the river near Delaware on March 31st.

BLACK-CROWNED NIGHT HERON (*Nycticorax nycticorax hoactli*).—One on May 7th near

Strathroy. Spring records of this species are not very numerous.

DUCK HAWK (*Falco peregrinus anatum*).—Noted twice, February 27th and March 25th. This is one of our rarest hawks.

ARCTIC THREE-TOED WOODPECKER (*Picoides arcticus*).—On March 13th one was seen in the spruce swamp four miles west of London, the first record for four years.

EASTERN HENSLOW'S SPARROW (*Passerherbulus henslowi susurrans*).—First heard on May 1st, was noted in a number of places in the surrounding district during the spring and summer.

NORTHERN PRAIRIE WARBLER (*Dendroica discolor discolor*).—One stayed for several days in the vicinity of the London South Collegiate Institute, having been first heard on May 12th.

Total species observed in Middlesex County by Club members during the year, 198.

THE YELLOW RAIL IN THE PROVINCE OF QUEBEC

By R. MEREDITH



ALTHOUGH I have been interested in birds practically all my life I had paid little or no attention to the Yellow Rail [*Coturnicops noveboracensis*] in this province, perhaps because there seemed to be no definite reference in any of the books I had read to its being a frequenter of this part of the world, and perhaps, which is more likely, because I had never seen one, and I began to regard it as a sort of myth.

However, after hearing a few years ago that Mr. Willie Labrie, of Kamouraska, had secured one in 1922, and that in 1930 two more had been killed at Ste. Anne de la Pocatière, my interest became awakened and I decided to look for it more attentively.

Luckily I was well rewarded, for on October 4th, 1931, while hunting snipe at Rivière des Chiens, about four miles west of Ste. Anne de Beaupré, with Mr. Cecil Thomson, his dog caught the first Yellow Rail I had ever seen, and on the seventh of the same month while shooting with Mr. Stuart Ahern, just west of Ste. Anne de Beaupré, my setter flushed another, which, luckily enough, contrary to the general habits of these birds, flew a long way and passed in front of me, so that I was able to shoot it.

On September 4th, 1932, I shot another at Chateau Richer.

On September 17th, 1933, while hunting snipe, without a dog, I was lucky enough to flush one of these birds at which I shot quickly as he was passing behind a low bush. I saw him alight, apparently unhurt, in the long grass on the other side of the bush and, having no dog, rushed up on the chance of finding him. Arriving on the spot I found he was quite alive and running through the coarse grasses which were about two or three feet tall, trying to evade me, all the time making a very faint, squeaking noise something like a young mouse. Curiously enough, again to the contrary of the general observations of others, on being hard pressed he flushed again and flew about ten feet, and this time I was lucky enough to be able to tramp the grass down over him and secure him.

On the twenty-second of September, 1934, Dr. D. A. Dery, of Quebec, was hunting snipe with Dr. Gustave Ratté, just west of Rivière des Chiens, when the former flushed and killed a Yellow Rail. A few moments afterwards Dr. Ratté flushed another which flew only a few feet, settled in the shallow water and started swimming away, but he made a dash for it and succeeded in catching it alive. It was kept in captivity for a short time; it was very tame and, almost at once, ate earth-worms readily.

On the nineteenth of October, 1934, Mr. Raymond, of Quebec, also shot one near Rivière des Chiens.

Mr. Willie Labrie writes me that he captured his bird in a rather singular manner. On the first of August, 1922, a farmer at Kainouraska told him that he had heard a strange noise in one of his fields for the past few nights; so he went to investigate but could see nothing. He decided the noise was made by some sort of bird so he shot as carefully as he could toward the sound, and in the morning, with the help of a dog, to his delight found he had killed a Yellow Rail.

The Ste. Anne de la Pocatière birds were taken on the 23rd and 24th of June, 1930, by Professor Elzear Campagna of the Agricultural College there, in company with Mr. George Bouchard, M.P., Dr. C. E. Pouliot, and others. These birds had been heard making their mysterious noises at night *toc-toc, toc-toc-toc; toc-toc, toc-toc-toc*; and were captured about midnight after a considerable chase with the aid of a lantern and a landing net.

Two or three years ago a gentleman from St. Charles de Bellechasse, whose name I do not recollect, told me that he had once killed a Yellow Rail in that vicinity while shooting snipe.

I am also informed that Mr. Low, taxidermist, of Montreal, secured a Yellow Rail at Yamachiche on October 9th, 1921.

The above are all the actual records I can find of the Yellow Rail having been taken in the Province of Quebec.

Mr. Taverner in *Birds of Eastern Canada* describes it as being one of our rarest birds, although he admits, as do all other writers, that it may be more common than is supposed, owing to the difficulty of flushing it, even with a dog.

Evidently Mr. C. E. Dionne had never seen one as his only mention in his *Oiseaux de la Province de Quebec* is to the effect that Couper

thought they were to be found in the province, and that Mr. Wintle believed some were killed between Sorel and Boucherville.

Mr. Comeau in his list of birds of the North Shore makes no mention of the Yellow Rail. Macoun, in his *Catalogue of Canadian Birds*, makes only one reference to it in the Province of Quebec, and that is at Fort George, James Bay.

It may be that this little Rail is only lately spreading into our Province, and in about ten or fifteen years from now, if a census is taken, it may be found to have become much more common than at present. This has been the case with many birds of which we know, and it is with that end in view that I have prepared these few notes.

Personally I am inclined to believe the reason so few of them are seen, even by snipe hunters in the fall, is because they seem to remain with us only during the month of September, and the early part of October, and live for the most part in the long uncut grass on our marshes, unfrequented by the snipe at that time of the year, and if a more extensive search for them were made in suitable spots, I feel certain they would be found more abundantly.

In all probability the birds taken by Mr. Labrie and Mr. Campagna and his friends were nesting, or about to nest, but it still remains for one of our ornithologists to have the honour of finding the first nest in this Province, and it may be helpful to them to know that the Reverend Mr. P. B. Peabody, of North Dakota, who has found so many nests there, and who knows more about it than anybody else, states that they are always found in a dryish meadow which has been cut over during the previous year, and are hidden under a wisp of last year's hay.

If anybody has any additional data regarding our elusive little friend, I shall be most grateful if he will send them to me, so that the present status of this bird may be made as up to date as possible.

NOTES AND OBSERVATIONS

A NOTE ON THE MIGRATION OF THE TIGER SALAMANDER, *Ambystoma tigrinum*.—I am inclined to believe that in this locality the Tiger Salamander carries out a sort of fall migration. This habit may be partly hereditary and partly due to force of circumstances. Salamanders of this variety are to be found moving about on

land only at the harvest season, and I have noticed that it invariably rains within a day or two after they begin their migration. This means that their bodies are moistened again within 48 hours after leaving their former habitation and, as they are always fully developed, they require only cool moist conditions

in their migratory search for a place to hibernate. Only a few must find suitable places for winter hibernation. I have reached the above conclusions after only three years' observation, but this note may suggest seasonal observations to persons in the other localities.—ROY L. FOWLER, *Aldersyde, Alberta.*

Gastrodonta multidentata NEAR OTTAWA.—While collecting lands shells in Rockcliffe Park, Ottawa, Ontario, during the month of July, 1934, I came across a colony of *Gastrodonta multidentata* (Binney.) on a rocky slope under the trestle of the toboggan slide. The diameters in millimetres of the six specimens are as following; 1.8, 2.0, 2.3, 2.7, 2.8, 2.8, the average diameter being 2.4. Two of the specimens taken were alive.

This species is very rare in the Ottawa district and the only previous find recorded is by F. R. Latchford, who mentions having found them on King's Mountain, Ottawa County, Quebec, and on the hills north of Hull City, Quebec. See *Trans. O. F. - N. N. C.* 6; 211, February 5th, 1885.—G. E. FAIRBAIRN.

NOTE ON LAMPREYS.—In the November, 1934, issue of *The Canadian Field-Naturalist* I find, on page 133, a note on "boils" in *Esox lucius*. "Boils" is used in some lay and not medical sense. In the latter case a boil is never an open sore, but means a confined collection of pus.

The context of the note leads me to suppose that we are dealing with wounds made by Lampreys. These never cause death so far as I know unless they are invaded by *saprolegnia* or some other microbe. Sea salmon when injured by nets or rocks in the course of their anadromous annual trip appear to be aware of the infection and that salt water will kill it. They go back to sea unless caught in the slack of nets on the way down. Netters all know about it.

Incidentally, Lampreys are so highly prized in Europe that the catch in any one river might be more valuable than the salmon catch. Any merchant can import "Aal in Gellee" from Europe and introduce a delicious food delicacy. I prefer the German form, still holding its French name in Germany.—ROBERT T. MORRIS, M.D.

FRESHWATER CLAMS AS BAIT.—Anglers are sometimes annoyed by the question of bait. Either they run short of bait, or have no means of procuring any, the soil being of a sandy nature or too dry to yield the ever reliable angleworm. I may say that in many instances fresh-water clams, which are generally plentiful, will prove to be good substitutes for worms. This past summer, the writer was most successful with clams when teasing Small-mouth Black Bass. Clams also landed Rock Bass and large minnows,— which could be used as bait later. You simply break open the clam and bait your hook with a piece sliced from the hard part of the mollusk. The bit of information may not have much scientific value, but it might be useful to many an embarrassed fisherman and add to the question of fish food.—HARRY BERNARD, *St. Hyacinthe, Que.*

NOTES RELATIVE to *Passerella iliaca fuliginosa* Ridgway—The references made to the Sooty Fox Sparrow by Mr. Hamilton M. Laing in *The Canadian Field-Naturalist* of February, 1934 (page 37) are extremely interesting.

A few further notes in relation to the known breeding range of *fuliginosa* may prove of interest.

During the month of May, 1931, when collecting on the west coast of Vancouver Island, Sooty Fox Sparrows were frequently heard and seen and a series of breeding birds and young secured. On May 7th and 8th six breeding birds were seen along Chesterman's Beach, near Tofino, the males being in full song and on May 9th numerous breeding birds were seen on Bare Island. It was not until May 22nd that juvenile birds were seen and secured and these were in numbers on Bare Island in different stages of development. Mr. Laing makes mention of the colour of the lower mandibles of the specimens secured on Hornby Island. The same remarks apply to the adults, both male and female, from the west coast and in referring to our notes we find that the bill colouring of all the adult birds is as follows: Upper mandible dark brown with marginal edges pale; lower mandible pinkish at base shading to bluish or blue-gray, tip brown. In the very young birds the whole bill is yellowish brown and in the fully fledged young the bill is olive brown with marginal edges yellow.

No nests were found but in every instance the birds, both adult and young, kept about dense patches of salal and scrub.

Referring to quotation from Brooks and Swarth *Distribution List of Birds of British Columbia*. Occasional trips to the mountains north and north-east of Vancouver within a radius of one hundred miles, during the past fifteen years, have failed to disclose any breeding form of Fox Sparrows other than *altivagans* which is quite common in suitable localities above five thousand feet altitude.—KENNETH RACEY.

THE RED-BREASTED NUTHATCH (*Sitta canadensis*) WINTERING in ALBERTA.—Early in January, 1934, Mr. Lew Hutchinson, whose farm is situated on the south bank of the Battle River, about twelve miles south-west of Camrose, phoned the writer that a Red-breasted Nuthatch was spending the winter in the spruce woods in the coulee near his farm buildings. He stated that it made frequent visits to his garden daily, where it fed with Black-capped Chickadees, on suet, provided for the latter birds. On February 1st, Mr. Alex. Ross, whose farm also is on the Battle River, and about two miles east of the Hutchinson farm, phoned that two Red-breasted Nuthatches had for some time been feeding with his Chickadees in his yard. In company with a party of Normal students, I visited the Ross farm on February 3rd and, while watching a flock of Redpolls as they fed on weed-seeds in the garden, a Red-breasted Nuthatch came from the spruces at the rear of the house, and alighted on a piece of suet, tied to the branches of a tree. Although we waited for some time hoping to see the second bird, it failed to appear.

While the Red-breasted Nuthatch is usually considered a fairly common migrant in Central Alberta, and in suitable localities, an irregular summer visitant, this is the first time I have ever noted it during the winter months. When consideration is given to the fact that the early part of the past winter was extremely severe, with temperatures in December, 1933, as low as 45° degrees below zero, and also that the above records were made in lat. 53° north, the occurrence of these birds at this time is all the more remarkable. — FRANK L. FARLEY, *Camrose, Alberta*.

EXTENSION OF RANGE OF COTTON-TAIL, RABBITS.—Cotton-tail Rabbits (*Sylvilagus floridanus*) made their first appearance in this district during the autumn and winter of 1933. Prior to that

time they were not known to occur within forty or fifty miles. I refer to the area covering the Townships of East Hawkesbury and Lochiel at the extreme eastern tip of the Counties of Prescott and Glengarry, bordering on the Province of Quebec. It is not generally known that rabbits "trek" or migrate. Personally I was always of the opinion that they did so and now I am able to verify it. The first capture of Cotton-tails in this locality came to my notice during the month of November, 1933.

While in conversation with a local trapper on whose veracity I can rely he told me of having caught three grey rabbits in a single hole and expressed the opinion that we were going to have a mild winter on account of the rabbits' not having turned white at that late season. This, and the fact that he had caught the rabbits in a hole, aroused my curiosity, as I was fully aware that the Snowshoe Rabbit (Varying Hare—*Lepus americanus*) does not burrow. On questioning him further he said he had been trapping for Skunk, and thought it a skunk hole but got no skunk in it. This set me to thinking, and I decided they must be Cotton-tail Rabbits, although I had no definite proof of this as, unfortunately, he had eaten the rabbits.

Subsequently I met another trapper who had also caught some grey rabbits in a hole and, as he still had them, I was able to secure one in the flesh and to determine it as a Cotton-tail on sight. Finally I got one in my own bush. All in all, about a dozen of these rabbits were taken during the past winter, so I feel sure they have become fully established here.

The Cotton-tail differs from the Snowshoe Rabbit in having shorter ears and legs, in being more stockily built, in averaging smaller in size and in retaining its grey pelage throughout the year. This "trek" of the Cotton-tails is eastwards and I assume that they have already crossed the boundary and are by this time, established in the Province of Quebec. My assumption is based on the knowledge that some of the fore-going captures were made within a mile of the Quebec boundary.—OLIVER TRAFFORD.

CORRECTION.—In *The Canadian Field-Naturalist* for December, 1934, page 138, Nelson's Sparrow is referred to as *Melospiza lincolni*. This, obviously enough, is an error, the correct name being *Ammospiza caudacuta nelsoni*.—EDITOR.

REVIEWS

EXPLORING THE ANIMAL WORLD by Charles Elton. George Allen and Unwin Ltd., 1933. 3s. 6d.

Those who know Elton's *Animal Ecology* will want to read this little volume, based on a series of radio talks. The aim of the talks apparently was to awaken interest in observing animals. The subjects dealt with are how to look for animals, woodland life, animal life at night, nature sanctuaries and plagues of animals. Naturally, the animals dealt with are those of the English countryside, the mammals, birds, ants, bees, spiders, etc., but as most of the ones mentioned have their Canadian counterparts, the accounts have nearly or quite as much interest and charm for the Canadian reader as for those for whom they were originally prepared. The book should be read by everyone interested in the new natural history of which Elton is one of the leading exponents.—J. R. D.

A FIELD GUIDE TO THE BIRDS. *Giving field marks of all species found in Eastern North America. Text and Illustrations in colour and in black and white.* By Roger Tory Peterson. Boston and New York, Houghton Mifflin Company, The Riverside Press, Cambridge, 1934. Price. \$2.75.

A book that the amateur bird observer has long been looking for and which the most seasoned ornithologist will find of value. Presented as "a bird-book on a new plan" it is the culmination of a movement in popular bird literature, that has been for some time in progress, whereby bird study has been stripped of its technicalities and with no loss of real accuracy, the meat offered to the general public without a shell of scientific verbiage and pedantry. It seems difficult to see how, within its class, it could be improved upon. It is a very practical working manual of field-marks, ignoring confusing detail and concentrating on the salient characters by which one bird can be distinguished from another under ordinary field conditions. It is not for the closet naturalist identifying birds in the hand who has other literature for the purpose; but, for the field worker who depends on eyes and glasses for

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The ample illustrations are naturally an important feature of the work. Nearly every species is illustrated either in black and white or in colour. A few of the former are pen and inks but most are wash-drawings in half-tone. They are not naturalistic representations, but are more or less conventionalized or diagrammatic, with confusing details omitted, to show the bird as it appears to the eye in the field with the critical distinctive points emphasised. The drawings are remarkable for their clear definiteness. The author-artist shows not only competent draughtsmanship and command of his art-media but knowledge and feeling for his subjects. In many cases in these simplified sketches he has caught the spirit as well as the outline and pattern of the various species. Many birds in juxtaposition are shown in identical attitude, a proceeding that may not satisfy artistic yearnings but is of practical assistance to direct comparison. Particularly should be mentioned the coloured plates of sparrows and warblers; these birds are shown of small size but with a sharpness of detail that is unusual in four-colour half-tone work. For these the plate maker and the printer should be commended.

It is a light, compact little volume in waterproof leatherette binding to stand the weather and fits nicely into the side coat pocket, just the form, size and substance to accompany one on a walk in a birdy neighbourhood. We highly recommend it and anticipate a great success for it.—P.A.T.

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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No. 4

ALFRED G. KINGSTON

1853 - 1934



IT IS RIGHT and fitting that a word of tribute to the memory of the late A. G. Kingston should appear in the pages of *The Canadian Field-Naturalist*, for he was, at the time of his death, not only one of the oldest members of the Ottawa Field-Naturalists' Club but one of its most faithful and, in his quiet and unostentatious way, one of its most earnest and enthusiastic members.

When I came to Ottawa in the autumn of 1877 I found a small band of active field workers in Natural History subjects—the centre and core of the Club—and among them was A. G. Kingston, interested especially in bird study. Others of this close associateship were James Fletcher, the enthusiastic, never-tiring life and centre of the group, W. A. Harrington, R. B. Whyte and H. M. Ami. They were all the best of friends, working in their several fields, taking a great delight in their discoveries and collections and in imparting their findings to their followers, the number of which was constantly increasing. They built up our membership through personal contact and service at the summer excursions and the important part they took in the winter series of lectures and demonstrations. Kingston was one of these doing especially good work in the field of ornithology, being meticulous in all his observations, though if questioned he always regarded it as his hobby and as a relaxation from his regular office work. From the first he was leader in ornithology at the excursions.

He was treasurer of the Club from 1891 to 1896 and vice-president for the years 1899-1900 and was for many years on the editorial staff of *The Naturalist*, editing ornithological notes and supplying occasional articles. Many will remember his lecture on the Chimney Swift, a bird in which he was extremely interested and on which he had made careful observations.

Mr. Kingston was born in Cobourg, Ontario, the son of Wm. Kingston, professor of Mathematics and Astronomy in Victoria College. He came to Ottawa in 1872, entering the office of the King's Printer but after a few years was transferred to the Department of Public Works where he remained until 1933, completing over 60 years in the Dominion Government Service.

As I have intimated, Mr. Kingston was of a quiet, retiring nature; keeping himself more or less in the back-ground but nevertheless winning many to a close and kindly friendship. I am sure he thoroughly enjoyed every phase of activity in the Club's life. He was most faithful in attendance; his presence could always be counted on at our outings and in the lecture hall. In this respect no one surpassed his record.

Mr. Kingston's death leaves us many kindly memories; it also leaves a serious gap in our local membership. We shall greatly miss one who did so much, especially in the early years of our history, towards the welfare and the building up of our Club.—FRANK T. SHUTT.

A "THREE-EYED" HADDOCK (*Melanogrammus aeglefinus*) CAUGHT AT ST. ANDREWS, N.B.

By DR. V. D. VLADYKOV
Biological Board of Canada



IN AUGUST, 1933 a haddock possessing a third eye was taken near St. Andrews, New Brunswick, on a line-trawl by Mr. C. Young of the Atlantic Biological Station.

The author is indebted to Dr. G. E. Richards, Director of the Department of Radiology, General Hospital in Toronto, and to Mr. T. B. Hurst of the same institution for their kind assistance in taking the X-ray photographs and to Dr. A. G. Huntsman for his kindly criticism.

ANATOMICAL EXAMINATION

The author has received the head of the above specimen for examination. Judging from the length of the head (145mm. from the tip of the snout to the posterior end of the opercle), it was a fish of about 58 cm. in (total) length. According to the scale-reading this specimen was caught in its 6th year (5+ years). On the whole, this specimen appears to be normal, except for the possession of an extra eye. The accompanying figures illustrate quite clearly the peculiarities of the specimen in question. The third eye at first glance appeared to be natural, but a close examination revealed its true characters.

The extra eye was located on the left side of the fish, between the supraoccipital crest and the opercle (Fig. 1). Around this eye there had formed a new thick orbital ring, which consisted of fibrous connective tissue, as is shown in Fig. 2. This orbital ring was elevated about 15mm. above the surrounding skin. The horizontal diameter of this orbit was 41mm. and the vertical 39mm. (outside dimensions).

A line drawn from the posterior end of the postorbital crest (ridge of the pterotic) to the beginning of the lateral line divided the orbit into two equal parts. Outside, the orbital ring was covered with skin, which was scaleless except around the base. The pigmentation of the skin of the orbit was practically the same as that of the surrounding parts of the head. The third eye had a horizontal diameter of 26 and vertical of 21mm., as compared with 34 and 30mm. for the corresponding dimensions of the normal left eye.

At the time of examination, the conjunctiva of the extra eye was broken, but according to Mr. Young in the living fish it was continuous and whitish in colour, like a cataract. On the ventral side of the eye-ball there was a notch, which corresponded to a projection of the interior part of the orbital ring (Fig. 1). On the dorsal side there was a remnant of the posterior straight muscle, which had no connection with the orbital ring. The eye-ball had evidently no attachment to the orbital ring or connection with anything inside the head. Normal eyes, however, are set in sockets and their outer covering is a development of the general integument and shows an unbroken gradation into this.

Inside the extra eye, only the lens, which adhered to the wall of the eye-ball, was fairly well preserved, while all other expected structures were altered from the normal or even absent.

The eye-ball at once fell from its orbit, giving an additional proof that there had been no attachment between them. The inner surface of the eye-ball showed a piece of the optic nerve, about 12mm. in length, unconnected with the orbit. In general, the inner and lower edge of the orbit, where the eye touched it, was smooth, although the dorsal part of the orbital ring, where the fragment of the eye muscle was present was somewhat rough. There was no connection between the eye muscle and the orbit. Forming the outer wall of the orbit ventrally, there was a projection, consisting of degenerated muscles and connective tissue, which had held the eye in. The bottom of the orbit was very rough, consisting of small pieces of bones, degenerated muscles and pus. Several haddock scales, which belong to a fish about 5 years old, were also found imbedded in this debris.

It may be noted, that the pterotic and post-temporal bones have definitely been cut in pieces and were not firmly fused to other parts of the skull, while in the normal haddock they are immobile. For a comprehensive account of the osteology of the haddock the reader is referred to Brooks (1885).

All the above-mentioned peculiarities of the third eye indicate that it did not originally belong

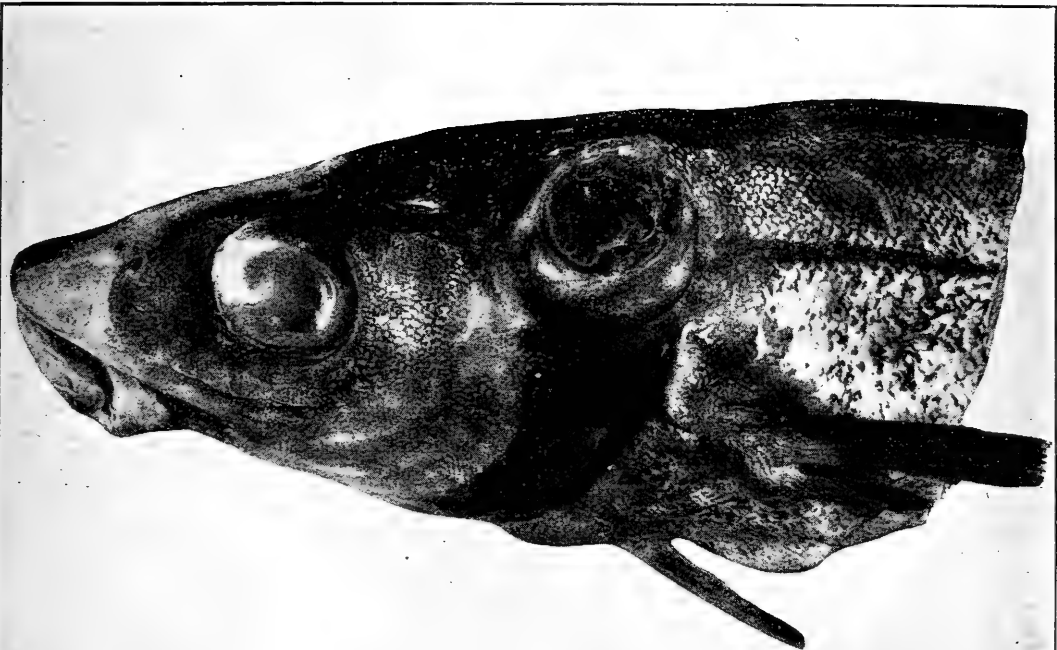


FIGURE 1.



FIGURE 2.

to the specimen studied, but had simply been transplanted to it from another fish. Gudger (1928) recently published an account of a "three-eyed", haddock taken in the south channel of Boston harbour. He was unable to obtain the specimen, having to judge the condition from photographs. The extra eye was on the back of the head in the median line and resembled a normal eye, but with its outer covering sharply delimited from the scaly skin. Grudger (1928, p. 570) states: "I am forced to the conclusion that this eye is a 'fake' one....; that skin, flesh and bone have been skilfully cut away, and another haddock eye has been dissected out and inserted in the artificial socket".

The preparation of three-eyed fish is probably more common than one would imagine. Gudger (1930, p. 48) quotes from *The Fishermen's Own Book* the following: "Seems there was a three eyed haddock brought in at T-Wharf. This don't impress me so much. I once had a buddy on one of these schooners, and he told me how he slipped up on a feller once, who was sitting off by himself on the trip home. This old feller was a great one for whittling, real handy with a knife. Well, he was working on the head of a haddock, real careful like, and when he got through, he brought a fish eye out of his pocket and slipped it in the hole, just as neat as you please. Never saying a word, he drops the three eyed haddock back with the other fish and the next day, folks was coming from far and wide down to the fish pier to see the latest wonder of the world, the three-eyed haddock."

From Europe also faked three-eyed fishes are known. Meek (1910, p. 44) refers to a case of a three-eyed dab (*Hippoglossoides limandoides*) which was made by a fisherman, who confessed his practice of making such specimens.

The specimen from St. Andrews possesses a certain resemblance to the one reported from Boston by Gudger. Judging from a photograph he presents (1930), his specimen had a narrow notch in the front of the third eye, which corresponds to a narrow projection of a bone (frontal). This projection together with the notch held the eye in place. The same arrangement was found in the case of the St. Andrews specimen. This indicates, that both specimens were probably made by the same technique. As Boston and St. Andrews are both in an area within which a common population would seem to migrate back and forth (Needler, 1930), it is not improbable, that the specimen caught at St. Andrews originated from the same source as that taken at Boston.

If the scales found in the pus of the extra orbit of the St. Andrews haddock were from the same specimen, having been accidentally conveyed there in the operation of putting the eye in position, they may indicate the approximate time of the operation. On these scales there are only five winter zones and there is no indication of any summer growth for a sixth year. On the other hand, scales from the side of the specimen show besides the five winter zones also a summer growth. This may be interpreted as showing that the transplantation of the third eye was made late in the fall or during the winter months of 1932-33, i.e. several months before recapture of the fish in August, 1933. Furthermore, only during cool weather would it be possible effectively to perform such a transplantation of the eye, since during warm weather haddock cannot survive out of the water for the time necessary to finish the operation, and as well the cool weather minimizes the possibilities of infection. On the other hand, the thick, fibrous orbit formed around the extra eye (Fig. 2) is proof that the operation must have been performed a considerable time previously, perhaps as much as six months.

HISTOLOGICAL EXAMINATION

Dr. W. H. T. Baillie of the University of Toronto has kindly furnished the following result of a histological examination of the specimen, which had been preserved in 4-5% formaldehyde.

"The wall of the false orbit consisted of a mass of fibrous connective tissue and capillaries covered on the outer side and upper edge and part of the inner side by an epithelial layer thin in places (one to two cells in thickness) in other parts heaped up (four to six cells in thickness). Beneath the epithelium there was no evidence of scale formation nor were pigment cells at all frequent. Toward the base some adipose tissue was present and on the inner side loosely applied were some small fragments of bone. There was no bony or cartilaginous change in the actual wall itself.

"The optic nerve showed degeneration of the nervous structures, but the form was maintained by the supporting fibres. The extrinsic muscle cells were degenerate and broken and the nuclei indistinct or lacking.

"The sclerotic coat showed a cartilage layer with little evidence of any destruction, but the cells of the cartilage appeared blurred. The perichondral layer was rather fragmentary.

"The choroid coat showed numerous spaces filled with cellular debris which had probably infiltrated from the host. Pigment was not

abundant in the choroid. The retina was markedly degenerated. The nuclear layers were irregular in shape, were distended and showed indefinitely staining cells. The rod layer was indicated, but the elements were almost indistinguishable especially since the pigment layer had penetrated a considerable but variable distance into the nervous layers of the retina, running in fine parallel or radiating lines at different points.

"These results seem to warrant the following conclusions:

(a) The false orbit is an attempt at repair of an injury and has proceeded to the extent of the heaping up of connective tissue around the foreign body and the partial growth of epithelium over the new formed tissue. The absence of epithelium on the inner side, the lack of scale formation and absence of bone or cartilage in the wall would strongly suggest that this is not an orbital cavity in the proper sense, but a response to injury.

(b) The degeneration of the optic nerve and extrinsic muscle cells, the infiltration of the choroid, the degenerative process in the retina and sclerotic associated with the increase in retinal pigment and its aberrant distribution would indicate that the eye itself was in a state of degeneration corresponding roughly with the time required to build up the wall of the false orbit.

(c) The time required to produce the effects noted in *a* and *b* above would be quite considerable. A rough approximation would be several months."

In conclusion, it may be stated confidently that the third eye in the St. Andrews specimen had been faked, in the same fashion as Grudger found for another haddock from Boston.

The "three-eyed" haddock described in the present paper has been deposited in the Royal Ontario Museum of Zoology, Toronto, where it may be seen.

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EXPLANATION OF FIGURES

- FIG. 1. Lateral view of the head of the three-eyed haddock, caught at St. Andrews. Note the third eye with its orbit and a small notch of the eye-ball on the lower surface.
- FIG. 2. X-ray photograph of the head of the same fish, as on figure 1. Note the third orbit, located on the top of the left side of the head.

THE MANITOBA MUSEUM

By DR. H. M. SPEECHLY



OR WANT of a historian the beginnings of things are often lost in the obscurities of even a very recent past. There is, also something to be learned in the way those very things began which might be instructive for other beginners. Hence these words!

Winnipeg with a history of not much above sixty years never seriously considered setting up a museum prior to 1932, because—well, it was too busy, or thought it was, with becoming a big city. True, the old Board of Trade building had a collection of miscellaneous material, some good, some bad; also the Hudson's Bay Company had its own excellent private collection of Indian,

Eskimo, and old-timer's material; and the University of Manitoba had a really good, if small, Geological Museum. But the City had nothing, which it could show to visitors, when they asked if there was a museum in Winnipeg.

Finally, after heaps of money which could have been put into a Museum had been dissipated uselessly in the past twenty-five years, it took the Depression to stimulate a real start. Some ten years ago the Natural History Society of Manitoba combined with the Young Men's Section of the Winnipeg Board of Trade to form a Museum Committee, but the insuperable obstacle of the unwillingness of Province, City, or private enterprise to provide a suitable building

stood in the way. At last amongst the relief works set on foot by the Depression there sprang up the fine new City Auditorium, built of our own Tyndall limestone, over which a Civic Commission was set up. In the middle of 1932 this Commission offered a well-lit gallery 130 feet long by twenty feet wide (let not Ottawa and Toronto smile!), well-heated, ventilated, and fire-protected, free of charge to serve as a Museum, provided that the management thereof was undertaken by a reputable body of citizens. Again the Museum Committee of the Natural History Society of Manitoba combined with a similar Committee of the Young Men's Section of the Winnipeg Board of Trade to call a public meeting of other bodies likely to be interested in the formation of a Manitoba Museum Association. At a meeting in November, 1932, of these bodies, who were addressed by Mr. S. R. K. Glanville, M. A., the Keeper of Egyptology in the British Museum, an Executive Committee was charged with the duty of organizing a Museum. Thus the Manitoba Museum came into being on December 15th, 1932, and is, therefore, now in its third year of existence.

It may be stated at once that it took some pluck and perseverance on the part of the Museum Staff to carry on with only the proverbial shoe-string, because it does not matter what quite simple procedure is adopted some money must be forthcoming. Public interest even to the extent of taking out an annual membership of one dollar is totally unreliable. Voluntary donation boxes are passed by without a blush by even well-to-do folk. These latter often think Art Galleries more worthy of support despite the fact that there is far more varied intellectual appeal in a Museum than in an Art Gallery. Apparently the public prefer spending money on being amused, although the said public in the old barren days complained, "Why haven't we got a Museum?" It seemed essential, therefore, that in view of the fact that some 20,000 people annually have already visited even our infant Museum the city should at least provide sufficient funds to ensure a suitable casing for exhibits and some sort of salary for the Museum Keeper. It is with much pleasure that it is possible to say that our enlightened City Commission has provided considerable funds for this purpose. This has counted for civic righteousness with the Carnegie Corporation and was therefore an excellent investment.

Another point worthy of mention is that, however much it may be desired that the Executive should jointly and severally actively promote the interests of the Museum, in practice

it is found that the initial struggle, and struggle it has been, to keep things going depends upon the few earnest souls. From the very first the Executive has claimed and received the support of the University of Manitoba. With this in view all the Curators of Sections were chosen from our University Professors, and the present Honorary Secretary is one of our advanced young University graduates. This ensures protection against the danger of having a Museum crowded with unrelated "curios" and worthless material.

THE MUSEUM OBJECTIVE

What is the objective of the Manitoba Museum? Primarily the object is to bring together a representative collection of Manitoban fossils, insects, birds, mammals, geological specimens, Indian and Eskimo material, and old-timers' relics, while not excluding certain articles and objects from other lands, which might otherwise go adrift and be lost or ruined. If only these latter are preserved for comparative purposes, they have a very distinct value over and above their æsthetic quality. For instance, in our Museum, we have the only complete clay Indian cooking-pot to be found anywhere west of Toronto. This, which came from Hartney, Manitoba, forms an interesting contrast with samples of Inca pottery and a Roman vase dug up from a cellar in the Isle of Wight. It also takes some time for people to realize that, in order to display correctly and safely, and especially safely, any kind of worthy material, suitable casing must be provided. Such casing costs a lot of money. At first we were greatly indebted to some of our merchants for the loan of a number of cases, but anyone who knows the requirements of a Museum is aware that commercial cases are rarely of a type adapted for such purposes. We were able to convince the Civic Commission that for proper display money would have to be provided from civic funds. Gradually it becomes more obvious to those of the general public who have valuable collections that it is better to give or lend these to the Museum, because not only are they seen and studied by large numbers of visitors, young and old, but they are protected from dust and the ravages of moths. Too often excellent material has been damaged by these agencies owing to the want of care and foresight of the owners. During the past twenty-five years also much native material has been absorbed by wealthy and foreseeing citizens of the United States and from Europe which ought to have formed the basis of comprehensive collections here in Win-

nipeg. The question of insurance sometimes crops up in relation to borrowed material. The answer to that is that only owners can insure. The Museum cannot do more than provide secure moth-proof, locked cases and a fire-proof building, both far safer than the homes from which the material comes.

THE VALUE OF A GOOD ORGANIZATION

A properly organized Museum Executive has another value to the Community by providing an authorized body for the inspection of and reporting on any revelation or discovery of prehistoric material such as a Plesiosaur or the antiquity now known as the Ojibway Boulder Mosaic covering some forty acres of granite outcrop in the Whiteshell Forest Reserve. Also when the ridiculous local claim was made and bruited abroad that a "Runic stone" with inscriptions had been discovered, the Museum refused even to consider this until someone competent to decide the matter had examined it. Our Curator of Geology, the late Dr. S. R. Kirk, had no hesitation in pronouncing this to be just a weathered stone.

It is absolutely essential to have a Museum Keeper who, during the open hours (10 a.m. to 5 p.m.), not only takes proper care of the Museum, but also is able to help enquiring visitors with intelligent information. Even in an infant Museum, like ours, this official is a busy man. We think that his salary should be one of the first considerations in the disposal of civic monies just as soon as the casing needs of the Museum are at least in part satisfied. Each of our Sections comprising Ethnology, Geology, Zoology, Botany and Entomology is governed by University professors. A very important Committee is the Equipment Committee which looks after all casing needs. Finance is cared for by an Honorary Treasurer and two others. The Executive Committee is not a lot of old fogies but contains active personalities including one woman, several of whom are steady supporters of the Natural History Society of Manitoba. It is interesting to note that the Museum has given a fresh impetus and interest to that Society. Indeed it has had the remarkable effect of adding to our very keen ornithologists a vein of enthusiastic interest in the science of Geology. The co-operation between the Natural History Society and the Museum Association is very valuable. It cannot be too strongly emphasized that the great secret of getting things done in any Community is to seek enlightened co-operation, reasonable give-and-take, and due consideration of points of

view without undue insistence on individual opinion. Known trouble-makers are the destructive bane of any such spirit of tolerance and should be steadily avoided. We have found that for certain social purposes designed to promote the interest of the Museum a discreet Committee of women has a very distinct function to perform.

THE EDUCATIVE INFLUENCE OF A MUSEUM

Undoubtedly, if the Museum is to be a living force in the City and Province, it must have a direct influence on the children and young people of school age and University standing. From the very first this kind of influence has been one of the foremost in the minds of the Executive. Literally thousands of children and young people have enjoyed the privileges of the Museum and are especially welcomed when accompanied, as they often are, by school and university instructors. The Museum Keeper has instructions to encourage youthful enquirers in every possible way and especially to assist visitors from rural points with desired information.

It has always to be remembered that a Museum must be attractive as well as educative if it is to appeal to young people. Therefore there must always be a wise element of showmanship, perhaps especially in a new Museum. In relation to adults, who hold the money-bags, only a few of the public are well-informed. The majority have still a relatively uninformed outlook and since it requires money to run the average public Museum, showmanship plays a very necessary function. Here is where a trained Director with a flexible mind, not fossilized, can always exercise a wise influence over the exhibiting of material, bringing forth from time to time "treasures new and old."

In these days also the Museum has been a great boon to those who have little or no occupation through no fault of their own. Such people, old and young, have made a great deal of use of our small but comfortable and clean Museum.

SOME OF OUR FINDS

Without undue elation we are a little proud of one or two exhibits. The complete Indian pot believed to be for cooking and made of clay has been already mentioned. We also show an Eskimo fishing net from Aklavik made about 40 years ago from whale bone. No other Museum possesses the fossilized remains of a Canadian Plesiosaur (*Trinacromerum*.) This was found at the foot of the steep south bank of the Assiniboine River, 80 miles west of Winnipeg by the Mayhew family. It was restored by the late Prof. S. R. Kirk, and completed by Dr. L. S.

Russell of the Geological Survey kindly lent to us by the Dominion Department of Mines. Originally this Plesiosaur was about 18 to 20 feet long, but the head and neck have never been found. The revelation of the existence of an Ojibwa Boulder Mosaic in the forested area of the Whiteshell River Forest Reserve was due to the action of our staff in following up information received. We asked the Provincial Government to issue a protective edict over the whole of the site and to prevent the removal of the snake and tortoise emblems. This protection has been granted. Another useful effort has been the placing of a number of old Red River relics under safe cover which were in danger of being ruined for want of care and protection. These date back to the early Red River settlement of 100 years ago and include household utensils and furniture as well as farm implements. Among them is a dugout canoe.

THE CARNEGIE GRANT

Having fulfilled certain conditions our application to the Canadian Committee of the Carnegie Corporation has resulted in a grant of \$1500.00 for educational equipment, not for salaries. With this welcome aid we have already sent one Museum exhibit to a country point 160 miles from Winnipeg as an experimental feeler in this direction; and our Equipment Committee has started to provide proper equipment for Birds, Insects, and Botany, employing local and Canadian labour by preference. It is a great adventure to lay the foundations of a Museum which shall serve Manitoba as well as Winnipeg and form a central link in the growing chain of the Museums of Canada thus serving the Dominion as a whole. Such is the ambition of our Executive.

SOME NOTES ON THE COTTONTAIL IN ONTARIO

By JAMES L. BAILLIE, JR.



THE COTTONTAIL RABBIT (*Sylvilagus floridanus mearnsii*) is one of the principal elements of the mammalian fauna of the more southern parts of Ontario. The farm-boy finds in it all the necessary attributes for sport and it seems, at all times, to be present in sufficient numbers to be dependable game. There is, in fact, no doubt that it is now more widely distributed in the southern, settled parts of the province than ever before.

Saunders¹ records that the Cottontail is said to have first invaded Ontario from the south about 1860 and nearly all authors (including Seton, Nash, Fleming, Soper and others) consider the animal a comparatively recent addition to the mammalian fauna of the province. That it existed here, however, in times even before the first arrival of Europeans, is shown by Wintemberg², who records the finding of *Sylvilagus* bones in the remains of an Indian village site in South Norwich township, Oxford County. The bones were identified by Drs. Gerrit S. Miller and J. W. Gidley of the United States National Museum and Wintemberg states that the absence of articles of European origin in the material obtained at the village site shows

that, in age, it dates back to the days before the white man.

With such definite archæological evidence of its presence in Oxford County or vicinity three hundred years ago, we might safely assume that the species was present in Ontario continuously from the time when the Indians were the only human inhabitants up to the present day, at least in the south-western counties of the province, bordering on Lake Erie. It might be argued that there is no corroboratory evidence in the literature of the existence of Cottontails until about 1860 but we maintain that the same might be said truthfully of other common mammals of the province of the present day, as it cannot be denied that the literature dealing with Ontario mammals prior to 1860 was, at best, fragmentary and we doubt not that other species, unquestionably here since time immemorial, remained unnoticed in print until that or an even more recent period.

Gapper³ in his account of the mammals of the Toronto region over one hundred years ago, does not mention the Cottontail, but we take this to mean that the animal had not at that period reached so far east, but was confined to the peninsula south and east of Hamilton.

¹ W. E. Saunders, "Notes on the Mammals of Ontario", *Trans. Royal Can. Inst.*, 18:306, 1932.

² W. J. Wintemberg, "Uren Prehistoric Village Site, Oxford County, Ontario", *Bull. 51, Nat. Mus. Can.*, 1928, p. 6.

³ A. Gapper, "Observations on the Quadrupeds found in the District of Upper Canada: extending between York and Lake Simcoe—", *Zool. Journ., London*, 18:206-7, 1830.

In an attempt to determine the present range of the Cottontail in Ontario we have had recourse to the records on file at the Royal Ontario Museum of Zoology, Toronto. The six places which together mark the northernmost limit of the animal's penetrations (so far as the writer is aware) are, from west to east, 1, Hope Bay; 2, Orillia; 3, Bancroft; 4, Plevna; 5, Russel; and 6, Port Sydney, and some remarks on the records obtained from these localities may be worth permanent record.* Fleming⁴ mapped its then known range in 1907.

At Hope Bay one was collected by the writer on May 21, 1930, and the individual was the only one seen during four months' field-work in the Bruce peninsula in 1930, 1933 and 1934 by the writer. The specimen is now in the Museum's collection. At Orillia the Cottontail first appeared about 1927 according to P. Wainman; at Bancroft the animal appeared for the first time about 1927 according to G. J. Hass, Chief Fire Ranger of the district; and at Plevna, 1927 is also given as the date when the species was first noticed by H. Elkington. At Russel the species must be quite numerous as the Toronto *Star Weekly* of February 3, 1934, contains a despatch to the effect that a resident has offered a private bounty of twenty-five cents for every Cottontail captured in the village or vicinity, due to their depredations.

In addition to the distributional information, the writer wishes to record some observations which have a bearing on numbers.

* One taken from a Groundhog hole on October 30, 1933, by Charles E. Kay—Skull in possession of Alfred Kay of Port Sydney. "It measured eighteen inches in length, and was a young doe that had never bred, the first Cottontail I ever heard of being taken north of the Severn, although they are numerous about Barrie." (Letter from Alfred Kay, dated March 22, 1934).

⁴ J. H. Fleming, "The Cotton-tail Rabbit in Ontario", *Ottawa Nat.*, 22:158-9, 1908.

A female Cottontail, collected by the writer at Mac, Simcoe County, on May 17, 1931, was found to contain, on examination, nine embryos and, our search of the literature having failed to reveal a litter of Cottontails containing so many individuals, we thought perhaps that others might be interested in the fact. The skin of the female, and the embryos, are now in the Museum's collection.

Bailey⁵ states that the number of mammæ is eight in a related species, *Sylvilagus auduboni*, and although we have been unable to find in the literature examined whether or not this is true of *floridanus*, the specimen collected was found to have precisely the same number and arrangement of teats, namely three pairs of abdominal and one pair of pectoral.

Seton⁶ says that Mearn's Cottontail has from four to six young at a time, sometimes as many as seven and *very rarely eight*. Nash⁷ states that they have from four to six young in a litter, Anthony⁸ records three to seven (average four), Nelson⁹ credits them with having from two to six and Snyder¹⁰ mentions the finding of five helpless young in a litter at Long Point, Ontario, on May 9, 1928. Long Point is on the north shore of Lake Erie.

In addition to these, the Royal Ontario Museum of Zoology collection contains a nest and seven small young Cottontails which had been procured at Arden, Ontario, by Robert V. Lindsay on July 31, 1932.

⁵ V. Bailey, "The Mammals of New Mexico", *N. A. Fauna*, No. 53, Dec. 1931, p. 58.

⁶ E. T. Seton, "Lives of Game Animals", 1928, p. 808.

⁷ C. W. Nash, "Vertebrates of Ontario", 1908.

⁸ H. E. Anthony, "Field Book of North American Mammals", 1928, p. 507.

⁹ E. W. Nelson, "Smaller North American Animals", *Nat. Geog. Mag.* 33:391, 1918.

¹⁰ L. L. Snyder, "The Mammals of Long Point and Vicinity", *Trans. Royal Can. Inst.* 18:136, 1931.

LIST OF THE VASCULAR PLANTS OF THE HORSETHIEF CREEK-- PURCELL RANGE, B.C.

By TITUS ULKE, Ph.D.

(Concluded from page 55)

ROSACEAE

Spiraea lucida Dougl.

Common; at low and middle elevations.

Potentilla anserina L.

Common; along R. R. tracks near mouth of Horsethief Creek.

Potentilla glaucophylla Lehm.

Occasional; in alpine meadow at 2000 m. elev.

Potentilla nivea L.

Occasional; on rocky slopes above timberline.

Potentilla pennsylvanica L.

Not infrequent; on open slopes at 800-1000 m. alt.

Potentilla quinquefolia Rydb.

Occasional; on rocky cliffs at 3000 m. elev.

Potentilla pulcherrima Lehm.

Occasional; at 2700 m. alt.

Dasiphora fruticosa (L.) Rydb.

Common; on open slopes or in meadows at 1000-2000 m. elev.

Fragaria platypetala Rydb.

Occasional; in woods or thickets at 2000 m. elev.

Sibbaldia procumbens L.

Common; above timberline in open meadows.

Dryas Drummondii Richards.

Frequent; on rocky slopes at 2000-2500 m. alt.

Dryas octopetala L.

Common; on rocky slopes at 2000-3000 m. elev.

Geum macrophyllum Willd.

Occasional; in swampy woods at 1000 m. alt.

Geum strictum Ait.

Not infrequent; in wet meadows at 1000 m. elev.

Sieversia ciliata (Pursh.) Don.

Occasional; at 1000 m. alt.

Rubus arcticus L.

Abundant; in cold mossy thickets at about 2000 m. elev.

Rubus parviflorus Nutt.

Common; in thickets at edge of woods at 1000-2000 m. alt.

Rubus strigosus Michx.

Frequent; along rocky edges of woods at about 2000 m. elev.

Rubus pedatus Smith.

Abundant; on mossy banks at 1700 m. alt.

Rosa acicularis L.

Occasional; at about 1000 m. elev.

Rosa Fendleri Crep.

Rare; at low altitudes.

Rosa Woodsii Lindl.

Occasional; at around 2000 m. elev.

Sorbus sambucifolia (Cham. & Schlecht.) Røem.

Occasional; in woods and on open slopes at about 2000 m. elev.

Amelanchier alnifolia Nutt.

Common; in thickets and woods at 1000-2000 m. alt.

LEGUMINOSAE

Trifolium hybridum L.

Occasional; near Wilmer.

Trifolium repens L.

Occasional; in meadow about Wilmer.

Melilotus alba Desv.

Rare; about Wilmer.

Hedysarum sulphurescens Rydb.

Frequent; on open slopes at 1500-1800 m. elev.

Hedysarum pabulare A. Nels.

Infrequent; in woods at 800 m. alt.

Astragalus aboriginum Richards.

Occasional; in open dry ground at 1300 m. elev.

Astragalus Bourgoyii A. Gray.

Rare; on rock slides at 2300 m. alt.

Oxytropis alpicola (Rydb.) Jones.

Infrequent; on slope of Mt. Thompson at 3100 m. elev.

Oxytropis gracilis (A. Nels.) Jones.

Infrequent; sandy border of woods at 1300 m. alt.

Oxytropis podocarpa A. Gray.

Infrequent; on Mt. Thompson at 3100 m. elev.

Oxytropis splendens Dougl.

Occasional; at 1500 m. alt.

Vicia americana oregana (Nutt.) A. Nels.

Occasional; in woods and thickets at 1000 m. elev.

Lathyrus ochroleucus Hook.

Infrequent; on hillside near Wilmer.

GERANIACEAE

Geranium Bicknellii Britton.

Rare; in dry soil at 1000 m. alt.

Geranium pusillum L.

Rare; in waste place near Wilmer.

Geranium Richardsonii Fink & Trautv.

Frequent; in moist thickets at around 2000 m. elev.

ACERACEAE

Acer Douglasii Hook.

Common; at 1000-2000 m. alt.

LINACEAE

Linum Lewisii Pursh.

Occasional; in open ground at 1000-2000 m. alt.

CELASTRACEAE

Pachystima myrsinites (Pursh) Raf.

Abundant; usually in woods at 1000 m. elev.

HYPERICACEAE

Hypericum Scouleri Hook.

Occasional; in wet meadows at 2200 m. alt.

EMPETRACEAE

Empetrum nigrum L.

Uncommon; at 1000 m. elev.

VIOLACEAE

- Viola adunca* J. E. Smith.
Occasional; on rocky slopes at 1700 m. alt.
- Viola canadensis* L.
Frequent; in rich soil, under conifers, at about 1300 m. alt.
- Viola montanensis* Rydb.
Rare; on a wet hillside at 1000 m. elev.
- Viola orbiculata* Geyer.
Frequent; in deep woods at 1000-2500 m. alt.
- Viola palustris* L.
Infrequent; in wet soil at 2000 m. elev.

ELAEAGNACEAE

- Elæagnus commutata* Bernh.
Occasional; on dry rocky hillsides near Wilmer.
- Leptargyrea canadensis* (L.) Greene.
Common; in woods or on open slopes, at 1000-2000 m. elev.

OENOTHERACEAE

- Epilobium angustifolium* L.
Common; at middle to high elevations.
- Epilobium latifolium* L.
Frequent; on gravel flats below Starbird Glacier at 2300 m. elev.
- Epilobium latifolium leucoflorum* Ulke.
Occasional; on gravel flat below Starbird Glacier, at 2300 m. alt.
- Epilobium alpinum* L.
Common; above timberline; frequently at middle altitudes.
- Epilobium anagallidifolium* Lam.
Frequent; above timberline; sometimes in wet places at middle elevations.
- Epilobium clavatum* Trel.
Occasional; above timberline; sometimes in wet places at middle altitudes.
- Epilobium Horneimannii* Reichenb.
Common; above or near timberline, in moist meadows or on wet slopes.

ARALIACEAE

- Echinopanax horridum* (J. E. Smith) Decne. & Planch.
Common; in low woods and thickets at 1000 m. elev.
- Aralia nudicaulis* L.
Occasional; in woods or on brushy hillsides at 1000 m. alt.

UMBELLIFERAE

- Zizia cordata* (Walt.) Koch.
Common; at 1000 m. elev.
- Osmorrhiza obtusa* Fernald.
Occasional; at 1300 m. alt.

Osmorrhiza divaricata Nutt.

Common; in woods or thickets at 1000-2000 m. alt.

Heracleum lanatum Michx.

Common; at border of woods and thickets at 1000-2000 m. elev.

Leptotænia multifida Nutt.

Occasional; on grassy slopes at 2000 m. alt.

CORNACEAE

Cornus stolonifera Michx.

Occasional; at 1000-2000 m. elev.

Cornus canadensis L.

Common; in deep woods at 1000 m. alt.

PYROLACEAE

Chimaphila umbellata occidentalis (Rydb.) Blake.

Frequent; in deep woods at 1000 m. elev.

Moneses uniflora (L.) A. Gray.

Occasional; in deep woods or on mossy banks at about 2000 m. alt.

Pyrola asarifolia Michx.

Common; in bogs or moist woods at 1000-2000 m. elev.

Pyrola chlorantha Swartz.

Occasional; in deep woods at 1000-2500 m. alt.

Pyrola secunda L.

Common; on banks or in dryish woods at 1000-2500 m. elev.

ERICACEAE

Kalmia microphylla (Hook.) Heller.

Common; in alpine meadows on sphagnum hummocks.

Phyllodoce empetriflora (Smith) Don.

Frequent; in meadows near and above timberline.

Cassiope mertensiana (Bong.) Don.

Abundant; in meadows above timberline.

Cassiope tetragona (L.) Don.

Abundant; in the Phyllodoce habitat about timberline.

Ledum groenlandicum Oeder.

Abundant; at 1500-2000 m. alt.

Rhododendron albiflorum Hook.

Occasional; in thickets at 2000 m. elev.

Menziesia glabella A. Gray.

Common; in woods at 2000 m. alt.

Arctostaphylos uva-ursi (L.) Spreng.

Common; on mountain slopes in shaly soil at about 2000 m. elev.

Vaccinium Vitis-Idæa L.

Occasional; on sphagnum hummocks at about 1300 m. alt.

Vaccinium scoparium Leiberg.

Common; about timberline on open slopes or in thin woods.

Vaccinium canadense Richards.

Common; at about 1000 m. alt.

Vaccinium membranaceum Dougl.

Abundant; at middle altitudes.

GENTIANACEAE

Gentiana acuta Michx.

Frequent; in wet thickets or bogs at 1000-2000 m. alt.

Gentiana propinqua Richards.

Common; on open rocky slopes or in meadows at 1000-2000 m. elev.

HYDROPHYLLACEAE

Phacelia Lyallii (A. Gray) Rydb.

Occasional; on open rocky slopes at 2000-2300 m. alt.

Phacelia sericea (Graham) A. Gray.

Occasional; on open rocky slopes at 2000-2300 m. elev.

Phacelia leucophylla Torr.

Occasional; along trails at 1500-2000 m. alt.

BORAGINACEAE

Lappula diffusa (Lehm.) Greene.

Occasional; in moist thickets at about 2000 m. elev.

Lappula echinata Gilib.

Rare; on dry slope near Wilmer.

Lappula floribunda (Lehm.) Greene.

Occasional; in moist woods at 1000-2000 m. elev.

Mertensia ciliata (Torr.) Don.

Infrequent; in moist woods at 2500 m. elev.

LABIATAE

Monarda dispersa Small.

Occasional; on prairie near Wilmer.

Prunella vulgaris L.

Common; in wet thickets and along streams at 1000-2000 m. elev.

SCROPHULARIACEAE

Pentstemon confertus Dougl.

Occasional; on limestone slope above main camp at 2100 m. alt.

Pentstemon virens Pennell.

Occasional; on open slope below Starbird Glacier.

Pentstemon ellipticus Coult. & Fish.

Infrequent; on slide above main camp at 2200 m. elev.

Veronica Wormskjaldii Roem & Schult.

Frequent; in meadows above timberline.

Castilleja flava Wats.

Rare; on rocky slope at 2500 m. alt.

Castilleja lauta A. Nels.

Occasional; at 2500 m. elev.

Castilleja occidentalis lauta (A. Nels.) Pennell.

Rare; in alpine meadow at 2500 m. alt.

Castilleja occidentalis Torr.

Occasional; in meadows or on rock slides above timberline.

Castilleja rhexifolia Rydb.

Frequent; in moist meadows at 1000-2000 m. alt.

Castilleja sulphurea Rydb.

Occasional; on dry prairie near Wilmer.

Orthocarpus luteus Nutt.

Infrequent; at edge of woods near Wilmer.

Pedicularis grænlandica Retz.

Frequent; in bogs at 2000-2500 m. alt.

Pedicularis bracteosa Benth.

Common; in alpine meadows at 1000-2500 m. alt.

Rhinanthus crista-galli L.

Occasional; in a marshy meadow near Wilmer.

LENTIBULARIACEAE

Pinguicula vulgaris L.

Abundant locally; in wet calcareous soil at 1000-2000 m. alt.

RUBIACEAE

Galium boreale L.

Common; in rocky soil at 1000-2000 m. elev.

Galium triflorum Michx.

Occasional; in moist woods at low and middle elevations.

CAPRIFOLIACEAE

Linnæa borealis L.

Common; in deep or thin woods at low and middle altitudes.

Viburnum pauciflorum Pylaie.

Occasional; in moist woods or thickets at low and middle altitudes.

Symphoricarpus occidentalis Hook.

Occasional; on a rocky bluff near Wilmer.

Lonicera involucrata (Richards.) Banks.

Common; at 1000-2000 m. elev.

Lonicera utahensis C. Wats.

Occasional; in thickets at 1000-2000 m. alt.

Lonicera glaucescens Rydb.

Rare; in rocky gully at 1500 m. elev.

VALERIANACEAE

Valeriana sitchensis Bong.

Common; in meadows above or near timberline.

CAMPANULACEAE

Campanula petiolata Rydb.

Common; at 1000-2500 m. elev.

COMPOSITAE

Picris hieracioides L.

Rare; in waste place near Wilmer.

Agoseris gracilens (A. Gray) Kuntze.

Frequent; on open hillside near Wilmer.

Agoseris scorzoneraefolia (Schrud.) Greene.

Occasional; on open hillside near Wilmer.

Leontodon lyratum Ledeb.

Rare; on rock slide at 2700 m. elev.

Sonchus arvensis L.

Rare; along tracks near Wilmer.

Ptilocalais nutans (Geyer.) Greene.

Rare; on sandy bluff near Wilmer.

Crepis nana Richards.

Rare; at 2700 m. alt. on Mt. Dome.

Chrysopsis villosa (Pursh) Nutt.

Frequent; in dry soil near Wilmer.

Solidago ciliosa Greene.

Rare; on rock slide at 2000 m. alt.

Solidago elongata Nutt.

Rare; in dry ground near Wilmer.

Solidago concinna A. Nels.

Occasional; on dry open hillside near Wilmer.

Solidago scrotina Ait.

Rare; on brushy slope near Wilmer.

Chrysanthamnus pulcherrimus A. Nels.

Occasional; on dry soil near Wilmer.

Aster conspicuus Lindl.

Common; at low and middle altitudes in thickets or thin woods.

Aster laevis L.

Common; on brushy slopes or in woods at low and middle altitudes.

Aster Fremontii A. Gray.

Common; in thickets near Wilmer.

Aster meritus A. Nels.

Occasional; forming mats in sandy places at middle or high altitudes.

Aster polyccephalus Rydb.

Rare; in prairie near Wilmer.

Erigeron acris L.

Rare; on brushy slope at 1000 m. elev.

Erigeron salsuginosus (Richards.) A. Gray.

Abundant; in moist meadows and woods at 2000-3000 m. alt.

Erigeron conspicuus Rydb.

Occasional; at low altitudes.

Erigeron caespitosus Nutt.

Frequent; on dry hillsides near Wilmer.

Erigeron compositus Pursh.

Frequent; on rockslides above timberline.

Erigeron uniflorus L.

Frequent above timberline on rocky slopes or exposed summits.

Erigeron aurcus Greene.

Occasional; on alpine slopes near timberline.

Erigeron melanocephalus A. Nels.

Frequent; on moist slopes near timberline.

Antennaria lanata (Hook.) Greene.

Occasional; on rocky slopes at middle elevations.

Antennaria media Greene.

Common; in meadows or on moist rocky slopes above timberline.

Antennaria rosea (D. C. Eaton) Greene.

Frequent; in gravelly meadows or along sandy trails at low altitudes.

Antennaria arida A. Nels.

Rare; on dry rocky slopes at middle elevations.

Antennaria anaphaloides Rydb.

Occasional; on dry hillsides at low altitudes.

Antennaria racemosa Hook.

Frequent; in meadows or on grassy slopes at middle to high altitudes.

Anaphalis margaritacea Hook. & Benth.

Frequent; along borders of woods at low altitudes.

Gnaphalium obtusifolium L.

Rare; in dry open places near Wilmer.

Gaillardia aristata Pursh.

Common; on open slopes and in meadows at low and middle elevations.

Achillea lanulosa Nutt.

Common; on rockslides and open slopes at 1000-3000 m. alt.

Artemisia discolor Dougl.

Frequent; on open rocky slopes at 1000-2500 m. elev.

Artemisia frigida Willd.

Frequent; on rocky benches near Wilmer.

Petasites palmata (Ait.) A. Gray.

Occasional; on moist cold peaty slopes above timberline.

Petasites sagittata (Pursh) A. Gray.

Uncommon; in swampy meadows at middle to high altitudes.

Arnica tomentosa Macoun.

Rare; on open rocky slopes near summits of the Purcells.

Arnica alpina (L.) Olin.

Common; on rockslides, rocky slopes or in meadows above timberline.

Arnica mollis Hook.

Occasional; in wet meadows at middle to high altitudes.

Arnica cordifolia Hook.

Abundant; in thin open woods and hillsides at low and middle altitudes.

Senecio canus Hook.

Frequent; on open slopes or in low meadows at nearly all altitudes.

Senecio Fremontii Torr. & Gray.

Occasional; in dense clumps among rocks at alpine stations.

Senecio conterminus Greene.

Occasional; on the highest rockslides and rocky summits.

Senecio integerrimus Nutt.

Infrequent; on dry rocky soil near Wilmer.

Senecio triangularis Hook.

Common; in moist thickets at low and middle altitudes.

Senecio taraxacoides (Gray) Greene.

Rare; on alpine slopes.

Senecio Burkei Greenm.

Common; in wet woods, thickets or meadows at low altitudes.

Cirsium hookerianum Nutt.

Common; at 2000-3000 m. altitudes.

NOTES AND OBSERVATIONS

THE SADDLE-BACKED SHREW IN RIDING MOUNTAIN NATIONAL PARK, MANITOBA.—To the list of mammals occurring in this park I am glad to be able to add the Saddle-backed Shrew, *Sorex arcticus*.¹

When driving through the park in 1896 with my father, the late Dr. Wm. Saunders, and Mr. S. A. Bedford, who was then Superintendent of the Experimental Farm at Brandon, I had a chance to set a small line of traps near Lake Audy, and in the morning they contained my very first specimen of this, the most beautiful of all our shrews, in fine winter pelage. The locality was a small sphagnum swamp, just where this animal would probably occur. The exact date was October 4, 1896, and the number in my collection is 473.—W. E. SAUNDERS, *London, Ontario*.

¹ This species has been known in zoological literature for many years as the Richardson Shrew, *Sorex richardsonii* Bachman (1837), but the latter name has been shown by Jackson (1925) to be a synonym of *Sorex arcticus* Kerr (1792).

DICKCISSEL INFLUX IN ESSEX AND KENT COUNTIES.—In his book, *Birds of Eastern Canada*, P. A. Taverner speaking of the occurrence of the Dickcissel (*Spiza americana*) in Ontario says, "A few have appeared for a short series of years in the region at the west of Lake Erie and then vanished to reappear some years later". That this species is enjoying a year of exceptional abundance may be evidenced by the following observations.

Returning on June 16th, 1934, from a visit to Ohio, where we had recent association with the Dickcissel, Mr. F. H. Emery and the writer were surprised to find the birds again in numbers along the north shore of Lake Erie.

At the extensive Point Pelee Marsh in Essex County, ten singing males were counted in a small area of approximately five acres. From these observations we gathered that quite a colony of these beautiful birds probably extended over the rest of the marsh. On further examination this proved correct for many more singing males were seen. Also, at the marsh at the entrance to Rondeau Provincial Park in Kent County, five males were counted.

These birds were apparently breeding in the above localities as many of the much duller females were also observed.

The fact that the marshes along here are somewhat dried up this year, providing suitable habitats, may account for the abnormal numbers of this species.—O. E. DEYITT, *Toronto, Ont.*

OCCURRENCE OF A KING RAIL (*Rallus elegans elegans*) IN SOUTHERN ONTARIO IN DECEMBER.—During a visit to the workshop of Mr. B. G. Belton, taxidermist at Sandwich, Ontario, on October 24, 1931, I saw a mounted specimen of a King Rail which, according to Mr. Belton's book of record, was taken near LaSalle, Essex County, Ontario, on December 15, 1930. I was told that it had been caught in a trap. Its sex was not determined.—HARRISON F. LEWIS.

EARLY NESTING OF THE AMERICAN GOLDEN-EYE (*Glaucionetta clangula americana*).—In view of the fact that the earliest nesting of the American Golden-eye that is recorded by John C. Phillips in his great work, *A Natural History of the Ducks* (Boston and New York, 1925, Vol. III, p. 315) is "a record of hatching on June 8 at Umbagog Lake" in western Maine, given by William Brewster, it seems desirable to publish

the fact that, at Carillon Island, Argenteuil County, Quebec, in the Ottawa River, about 31 miles west of Montreal, a female American Golden-eye accompanied by six downy young was seen swimming on the river by Mr. J. Albert Decarie and me on May 31, 1931.—HARRISON F. LEWIS.

SNOWY OWL CAPTURES A CROW.—When motor-ing on April 25th, 1931, in the vicinity of Rosser, Manitoba, some twenty five miles north-west of Winnipeg, the odd sight of a Snowy Owl (*Nyctea nyctea*) carrying off a Crow (*Corvus b. branchyrhynchos*) was witnessed by M. C. L. Broley and the writer. Through the kindness of Mr. Broley, I had been out to see an enormous assemblage of Blue Geese (*Chen caerulescens*) which had, since their arrival from the south, been feeding in the grain fields near Rosser. When returning to Winnipeg in the afternoon, traveling south along an old trail, a Snowy Owl, carrying in its talons a Crow, appeared suddenly from behind the car and crossed the trail in front of us. The weight of the crow seemed to hamper the owl in its flight as it was losing altitude rapidly, and it alighted

in a pasture field a few hundred feet to our right. No sooner had the Owl taken up its position to partake of the catch, than a scattered company of about thirty Crows, flocked in from our rear and formed a circle, surrounding the Owl. With loud angry cawings and out-stretched necks, the whole scene presented a real musical (?) comedy. This exhibition of numbers on the part of the Crows did not in the least perturb the Owl and it calmly proceeded to devour its victim. In a very short time it was evident the Crows decided nothing could be done to help their comrade, and in small bands they dispersed in the same direction whence they came.—FRANK L. FARLEY, *Camrose, Alberta*.

THE BIRDS OF CANADA by P. A. Taverner, National Museum of Canada, Bulletin No. 72, Biological Series No. 19, 1935, Ottawa, Printer to the King's Most Excellent Majesty. Combining the two previous volumes under the same auspices,—the Birds of Eastern Canada and the Birds of Western Canada. pp. 445; coloured plates I-LXXXVII; text figures 487; coloured map end sheets. Can be obtained for \$2.00 postpaid from the National Museum of Canada, Ottawa.

REVIEWS

MAMMALS COLLECTED BY T. T. AND E. B. McCABE IN THE BOWRON LAKE REGION OF BRITISH COLUMBIA, by E. Raymond Hall. *Univ. Publ. Zool.*, vol. 40 no. 9 pp. 363-386, 1 figure in text. November 5, 1934

The subject matter of this report is found in a collection of 1182 specimens, representing 43 of the 45 species listed. The region concerned is just south and east of the center of British Columbia, toward the slope of the Rocky Mountains. As a painstakingly accurate statement of the systematic status and geographic significance of each of the species concerned this list will function as a satisfactory basis for comparison, in any similar work that may be essayed in adjoining regions. With an unusually adequate collection for subject matter, there were already in the Museum of Vertebrate Zoology, available for comparison, collections from other parts of British Columbia that bore upon the same problems as were here presented. The report marks a definite advance in our comprehension of mammalian affinities and distribution throughout the Province. One new subspecies is named, *Canis latrans incolatus*, and for several forms there are reported substantial extensions of the known ranges.

As a general proposition I think that the mammals of the interior of British Columbia may be described, as here indicated, in terms of two partly overlapping faunas. There is a population that composes the northern periphery of a Great Basin — Rocky Mountains assemblage, another population composing the western periphery of a subarctic-transcontinental population. The former extends in all purity north into southern British Columbia, in considerable numbers as far north as the Bowron Lake region, and it finds its northern limit (except for stragglers such as *Zapus princeps saltator*) at the rise of land immediately north of the Skeena Valley. The last mentioned assemblage of transcontinental forms, supplies most of the species of northern British Columbia south to the Skeena drainage, with stragglers such as *Zapus hudsonius tenellus* extending somewhat farther. The partial overlapping of these two faunas supplies suggestive subject matter in the study of distribution. It is, I think, the explanation of the frequent occurrence of two closely related animals over the same ground, such as the above-mentioned species of *Zapus*. There must have been many ecological adjustments that would merit investigation.

It seems paradoxical to say that thirty or forty years ago such a report from such a region would have carried a much stronger air of finality. There appeared at that period a rapid succession of descriptions of many species and subspecies, upon the basis of characters that could not at once be correlated, and with little or no understanding of the historical background to the situation. The result was a series of isolated forms, explicitly named but imperfectly understood. It remained for such studies as the one here reviewed to provide better understanding, and of late years some progress has been made in the case of the smaller species, as in the forms of *Zapus* in the present instance. There is, on the other hand, a realization of the inadequacy of data pertaining to many nominal forms that results in the tentative use of names and in the many qualified statements. This is especially true of the larger, more conspicuous mammals; for the timber wolf, as an example, we find *Canis lycaon* here used simply because it is the oldest of the many names that have

been published, and because no one can tell us just what these different names mean. The same may be said of the Woodland Caribou, of the Mountain Goat and of other species. The sort of research that is needed, difficult enough to pursue, is exemplified in Charles Sheldon's study of the Mountain Sheep of the northwest (in *The Wilderness of the Upper Yukon*). Sheldon made the facts clear enough in a peculiarly complicated situation, and he incidentally exposed the discomfiting limitations of our system of nomenclature.

In the naming of *Canis latrans incolatus* the author performs excellent service, exposing thereby the fallacy of the oft-repeated statement that the coyote is a new arrival in the northwest. This is a belief that is wide-spread over the northern country. I have heard it expressed by many individuals, but always by people who seem themselves to have arrived in the country about the same time as the Coyote.—H. S. SWARTH, *California Academy of Sciences, San Francisco.*

EXCURSIONS OF THE OTTAWA FIELD-NATURALISTS' CLUB, 1935

MAY 4—McKay Lake and vicinity. Take Lindenlea O.E.R. car and meet at Acacia Avenue and Maple Lane at 3 p.m. Leader—Mr. Hoyes Lloyd and others.

MAY 11—Val Tetreau. Take Hull E.R. car at Chateau Laurier at 2.30 p.m. and meet at Monument, foot of Main St.

MAY 18—Fairy Lake. Take Hull E. R. car at Chateau Laurier for Wrightville and meet at Wrightville terminus at 3 p.m.

MAY 25—Britannia. Take Britannia O.E.R. car and meet at terminus at 3 p.m.

JUNE 8—Pink's Lake. This will be a bus excursion and will probably leave from the Gatineau Bus Co.'s terminal on George St. Full particulars will be announced on the Fairy Lake and Britannia excursions.

JUNE 15—Black Rapids. This will be a boat trip, Dr. M. G. McElhinney having kindly placed his motor-boat, the Summertime, at the disposal of the Club for the day. Particulars as to time to be announced as above.

In the case of the last two excursions, the cost will be divided among those taking part, as in previous years.

W. H. Lanceley, Chairman, Excursions Committee, Phone R. 1196 J.
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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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OTTAWA, CANADA, MAY, 1935

No. 5

THE CANADIAN SNOWSHOE RABBIT ENQUIRY, 1933-34.

Edited by CHARLES ELTON and G. SWYNNERTON

(Edited for the National Parks Branch, Department of the Interior, Ottawa, by CHARLES ELTON, Director of the Bureau of Animal Population, Oxford University, England, with the assistance of G. SWYNNERTON.)

THE PRESENT REPORT contains the third set of maps resulting from this enquiry, covering the twelve months ending May 31st, 1934. The origin and aims of the enquiry, and the methods adopted in obtaining and mapping information, have already been explained in detail in the two previous reports: *Canadian Field-Naturalist* 47: 63-69, 84-86, 1933 and 48: 73-78, 1934.

The snowshoe Rabbit or Varying Hare, *Lepus americanus*, has a violent fluctuation in numbers with a periodicity of about ten years in most parts of Canada, and most marked in the northern forests. At the time when this enquiry was begun, in 1931-32, snowshoe rabbits were on the increase in most parts of the country, after a period of scarcity in the years 1927-29. The National Parks Branch enquiry gave a clear proof of this, since 85-92% of the total area covered by its observers reported increase, while for the northern forest belt the figure was as high as 95-97%. Even allowing for possible errors in observation and mapping, these figures gave overwhelming evidence of a general increase in most parts of the country between the fur seasons of 1930-31 and 1931-32.

In the following twelve months, 1932-33, there was again an almost universal record of further increase. The inclusion of reports from the Hudson's Bay Company made these results additionally significant, since they covered large stretches of country not reached by the Parks Branch observers, the overlap between the two being only about 9% by area. In this twelve months there appeared a new feature: the outbreak of epidemics on a large scale, mostly in the winter and spring of 1932-33. The maps for this year therefore showed general increase (often up to high abundance, as shown by the reports), with

disease beginning to eat into the population, especially in the Peace River region and parts of Athabasca and Northern Saskatchewan, also in the country between James Bay and the St. Lawrence River. This was the situation in the spring of 1933. It was forecast that the decline of the rabbit cycle would continue during 1934, leading to general scarcity (involving various fur-bearing animals, such as the lynx, fox, wolf and coyote) by 1936-37. This conclusion has been fully confirmed by the results for 1933-34, which are described below.

The sources of information are as follows:

1. The fullest information has, as before, come through the organization of the National Parks Branch of Canada, from whom 478 replies were received. We are indebted to the Commissioner, Mr. J. B. Harkin, and to the following, whose services made this result possible: Mr. W. L. Taylor, National Parks of Canada, who handled the details of the National Parks questionnaires in Ottawa, The Royal Canadian Mounted Police, the Game Officers of the Provinces of Canada, Honorary Game Officers and Holders of Scientific Permits under the Migratory Birds Convention Act, Taxidermists, Superintendents and Wardens of the National Parks, and other observers throughout Canada.

2. The annual zoological reports of the Hudson's Bay Company (of which 121 contained relevant information about the snowshoe rabbit), were again made available, through the kind interest taken by the Governor, Mr. P. Ashley-Cooper, and the Committee of the Company, and the Fur-Trade Commissioner, Mr. Ralph Parsons.

3. The Commissioner for Natural Resources for Newfoundland, Mr. J. Hope Simpson, kindly agreed to co-operate in the annual enquiry. A report covering the five divisions of Newfoundland has been received from the Secretary of the Department of Natural Resources, Mr. Gower Rabbits. The Bureau

is indebted to The Hon. Mr. Fred Alderdice, Prime Minister of Newfoundland, and to Sir Wilfred Grenfell, for their friendly support in getting this arrangement made.

4. Through the kind co-operation of Mr. C. R. Townsend, Factor of the Consolidated Paper Corporation Ltd. at Port Menier, it has been possible to include also a report upon the snowshoe rabbit population of Anticosti. Anticosti is a large island in the Gulf of St. Lawrence and forms part of the province of Quebec.

5. By courtesy of the United States Bureau of Biological Survey, an enquiry was made through the Alaska Game Commission, who who supplied five reports covering large districts. We wish to thank the former Chief of the Bureau of Biological Survey, Mr. Paul G. Redington, the present Chief, Mr. Jay N. Darling, and the Hon. John W. Troy, Governor of Alaska for their co-operation; Mr. H. W. Terhune, who arranged the enquiry in Alaska; and Mr. Copley Amory for personally taking up this matter in Washington

on behalf of the Bureau of Animal Population.

The third year's results therefore enable a more complete picture to be presented than has been possible before, in that they have an international scope, and also cover two islands (Newfoundland and Anticosti) in which snowshoe rabbits appear to have the same cycle as on the mainland, although they were only introduced in recent years. This is a very important fact to establish, since it would form a fairly conclusive proof that the periodicity of the cycle is controlled by some climatic factor at present little understood — a conclusion supported already by the extraordinarily wide region over which the cycle takes place, and over which it has "kept in step" for at least a hundred years.

It is not necessary to repeat in detail the description of methods used. The full questionnaire was printed in the first report for 1931-32. Since then a question about numbers of birds of prey has been added, in order to link up the snowshoe rabbit work with the ornitho-

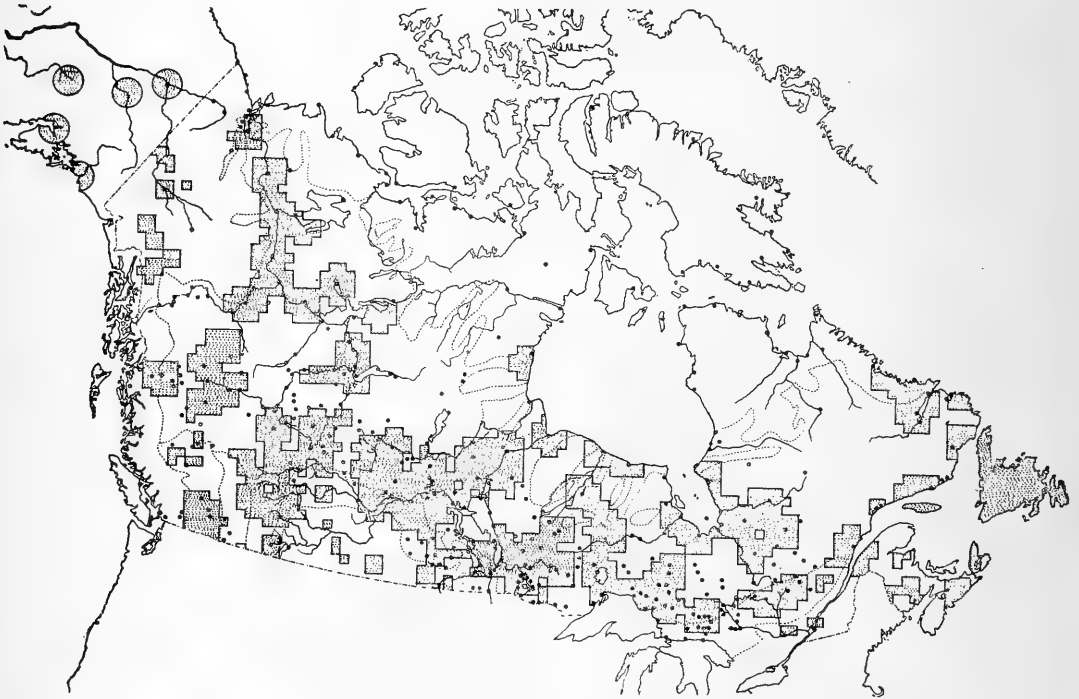


Figure 1.— State of the snowshoe rabbit populations in 1933-34. Dotted areas in Canada are groups of squares overlapped by areas of observers reporting relative increase in 1933-34 over 1932-33. Dotted areas in Newfoundland, Anticosti and Alaska are actual areas reporting increase. Larger black dots are Hudson's Bay Company posts, etc. Broken lines show main vegetation zones.

logical interests of the National Parks Branch. The same questionnaire is used as a base for the Newfoundland, Anticosti and Alaska enquiries. In all instances the main comparisons of abundance are on a year-to-year basis, in order to reduce to a minimum errors of memory and of personal opinion. Absolute estimates such as "very abundant" or "very scarce" are recorded but not mapped.

A mass of valuable records about habitats, epidemics, symptoms of disease, parasites, predators, remains to be worked up. The mapping is done on an area basis plotted first on large-scale maps as the areas covered by individual observers, and then transferred to a grid of 30 x 30 mile squares on a map of Canada. The planimeter measurements discussed in the last report showed that the original areas are exaggerated (about doubled) by the grid method. This method is the only one, however, which enables records for the different provinces (which mostly have different scales of map) to be transferred onto a common map. Although the method has drawbacks, these drawbacks are known and their extent can be measured, and

they do not greatly affect the general conclusions that are drawn about relative increase and decrease of snowshoe rabbits. The great advantages of this system of mapping are that it reduces to a minimum personal bias in plotting the questionnaire results, and it makes allowance for the different sizes of area covered by observers. In one matter, however, personal judgement has to be used: some observers report about very large areas. The conventional circle used for people who do not give a detailed description of their area, is one of twenty-miles diameter. This is a very cautious figure, and a great many areas are larger. Anything more than a hundred miles across is considered as doubtful unless there is good reason to suppose that the observations are reliable. It is a fairly simple matter to decide these cases without biasing the result.

Each Hudson's Bay Company post is given a circle with a fifty mile radius (100 mile diameter). This has been checked by sample reports of the exact districts covered and found to be an approximate limit. Where posts lie closer together than this a simple division is

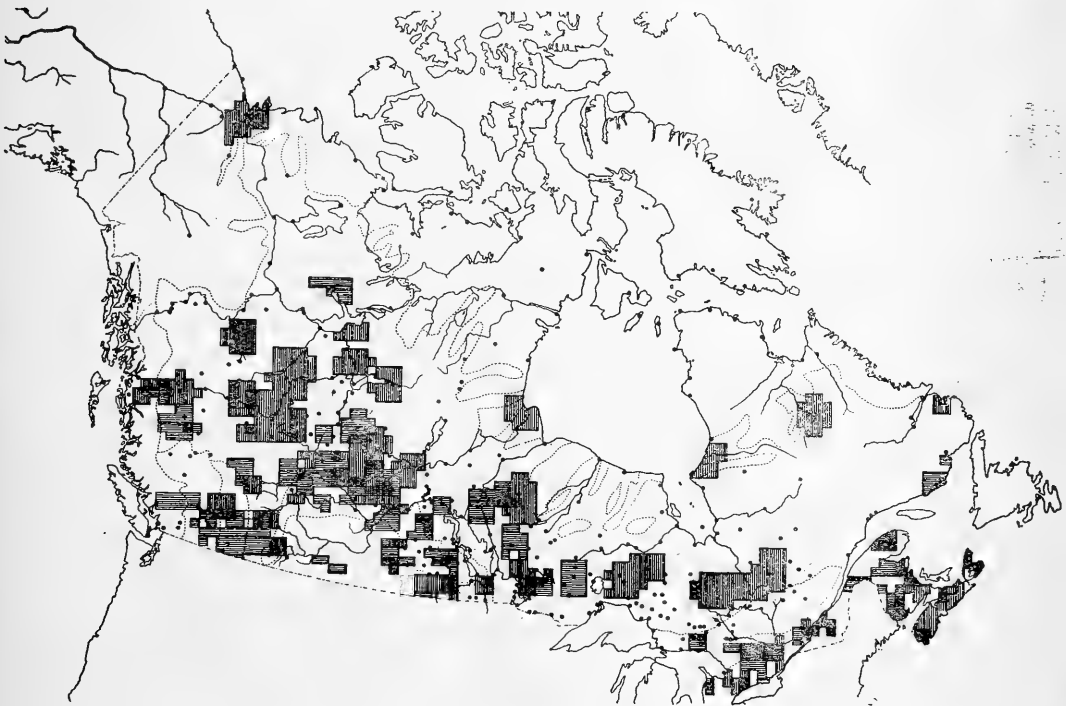


Figure 2.—State of the snowshoe rabbit population in 1933-34. Vertically hatched areas are groups of squares overlapped by areas of observers reporting relative decrease in 1933-34 over 1932-33. Horizontally hatched areas, no change. Larger dots are Hudson's Bay Company posts, etc. Broken lines show main vegetation zones.

made between them. Whereas the Hudson's Bay Company results have been combined with National Parks Branch results on the same grid, those for Alaska (covering also circles of 50-mile radius round Fort Yukon, Fairbanks, McGrath, Anchorage, and Cordova, have been left in their original form. No epidemics had been noted in 1933-34, but valuable data were given for some previous cycles, confirming other evidence that the Alaskan snowshoe rabbits take part in the ten-year cycle and synchronize with North-West Canada.

The Newfoundland report states: "Our five supervisors ... report rabbits increasing on all Divisions and that during the last two years they have been in abundance, exception in localities where they have been hunted to excess. ... The five supervisors cover the whole of Newfoundland. The rabbit has spread to all parts of Newfoundland."

On the basis of this report and in the absence of details, the whole island has been dotted in, although it is realized that local variations must occur, *e.g.* due to country unsuitable for snowshoe rabbits. Anticosti contains much

suitable snowshoe rabbit country, and Mr. Townsend reports that they were more abundant than in the previous year, occurring mostly in young second growth (bush) country, and that no epidemic had been noted.

The three maps should be compared with those given in previous reports. They show several new features.

(1) Although a large area still reported increase in 1933-34, the area relatively was less than in 1932-33.

(2) The areas reporting decrease or no change had very greatly extended, and in a remarkable number of cases overlapped areas still reporting increase. In other words there was much difference of opinion. That this is not simply due to faulty observation is proved by the clear-cut nature of the two previous enquiries, and by the obvious competence of most of the replies.

(3) The areas that reported epidemic in 1932-33 were in many cases reporting decrease in 1933-34.

(4) The areas of epidemic had greatly extended by 1933-34.

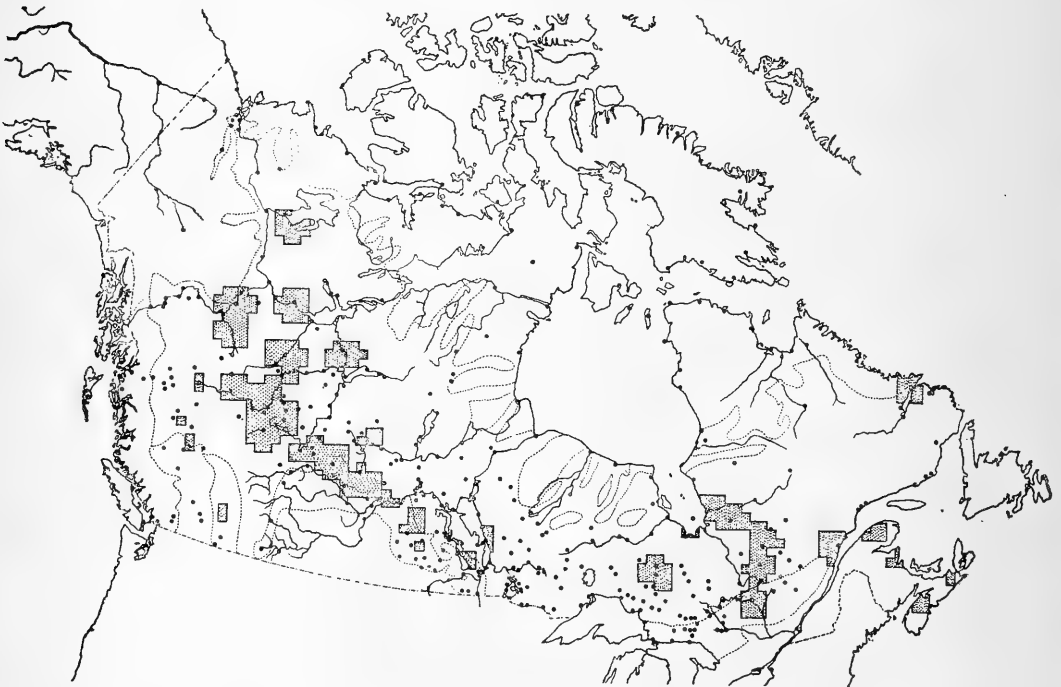


Figure 3.—Epidemics among snowshoe rabbits. Dotted areas are groups of squares overlapped by observers reporting epidemics in 1933-34. Larger dots are Hudson's Bay Company posts, etc. Broken lines show main vegetation zones.

These features are probably to be explained in the following way: snowshoe rabbits increased generally over Canada until the spring of 1933, when they began to die off in the areas in the North-West and East. During 1934 many areas still showed increase, but in others the increase was slowing down through disease and other factors (? lower rate of reproduction) resulting perhaps from the density having reached a saturation point. Hence the conflicting reports. Leopold has already shown in his game survey of Wisconsin that the "crash" in game-bird and rabbit population does not occur in a sweeping manner, but starts in patches, giving at a certain point a "moth-eaten" pattern of abundance. Our impression is that the winter and spring of 1934-35 will have witnessed the major "crash" in the snowshoe rabbit populations of Canada, and that the present maps show the situation just before such a "crash".

Turning to the regional distribution, we notice that rabbits were still increasing without as yet much sign of epidemic or decrease, in Alaska, Yukon, Northern British Columbia, and parts of central Canada (Ontario, Manitoba and Southern Alberta especially), and in the extreme East. The detailed figures are given in Tables 1 and 2. The epidemic area already developing in the Peace River, Athabasca country and parts of Saskatchewan, had extended, while the small centre in Quebec had also grown in size, covering a strip from coast to coast (see Table 2). In our opinion this "spread" is to be attributed to a spreading area of saturation-density leading to the outbreak of epidemic disease.

Some of the larger reports have not been mapped, but are quoted below:

BRITISH COLUMBIA. — That portion of the Province of B.C., west of the Cascade Mountains and north of the 51st degree of N. lat., including the Cassiar and Atlin Districts, throughout the river bottoms and bench lands. *More abundant*: they are increasing steadily. No epidemic in this district since 1928. (E. Martin, Game Warden).

ALBERTA. — "Central Alberta, from Edmonton north about 100 miles, in bush. *More abundant* in the Edmonton districts with a few exception. *Less abundant* in the Athabasca district and west of Fort Assiniboine. Rabbits were dying in the fall in large numbers along a line roughly from La Biche to Fort Assiniboine. In some spots there has been a high rate of mortality again this spring. In the Edmonton district there has been no such

mortality yet. The numbers do not compare with those of the last peak — 1924-25 ... There has been one case of tularæmia (in rabbits). The snowshoe generally has been loaded with tapeworm cysts as is usual at the peak, but it is doubtful if this alone is a lethal factor. Ticks are just now infecting them in enormous numbers. Three is the highest number of embryos observed this spring. Horned owls are extremely abundant. Coyotes have returned almost everywhere, but for the last 12 months or more have been very mangy. Grouse generally have been more plentiful than for the last ten years, but have disappeared almost completely to the north, in several districts preceding the "crash" of the rabbits. Goshawks, resident through the winter, have been unusually abundant." (Professor William Rowan, Alberta University, Edmonton. This report is particularly valuable, being based on a careful scientific enquiry by a team of observers in Alberta, and also because of Professor Rowan's previous studies of the cycle problem. It gives an excellent picture of the features characteristic of the snowshoe rabbit peak.)

MANITOBA AND ONTARIO. — "All Northern Manitoba, north of Hudson's Bay Railway to N. W. T. boundary, and east (Severn and Trout rivers to Manitoba-Ontario boundary). In bush and muskeg country. *More abundant*. No epidemics. Hawks and owls were more numerous than usual last Summer. (Hugh Conn, Hudson's Bay Company, Winnipeg).

ONTARIO. — "Kenora district, Ontario: taking in Shoal Lake, northern part of Lake of the Woods, Winnipeg River and Lac Seul. Rolling regions, rabbits seen mostly in wooded valleys. Numbers about the same as last year. No epidemic. Scarcity of snowshoe rabbits in this district about 4 or 5 years ago, and since that time have steadily increased in number and are plentiful at the present time." (Corporal N. C. Scheer, Kenora Detachment, Royal Canadian Mounted Police).

"Area: all northern Ontario. Rabbits in swampy land as well as bush. Very plentiful 1933-34. Epidemic in 1927, coming back 1931, peak of cycle in 1933-34." (Wally Hawson, Game Warden).

QUEBEC. — "Country of Abitibi, in the bush and swamps. The number is about the same as last year, very abundant. No epidemic." (Constable, Royal Canadian Mounted Police, Amos Detachment).

One would like to quote a great many of the reports, but space forbids. All the others containing relevant information have been incorporated in the maps.

TABLE 1
*State of the Snowshoe Rabbit population in
Canada, 1933-34.*

	Total	Increase	% Increase	Decrease	% Decrease	No Change	% No Change	Epidemic	% Epidemic
Yukon	33	27	79-82	7	18-21	0	0	2	6
Northwest Territories .	150	136	79-91	22	9-15	10	1-7	34	23
British Columbia . .	194	123	41-63	52	13-27	77	20-40	32	16
Alberta	200	132	32-66	94	27-47	48	6-24	85	43
Saskatchewan	158	111	31-70	77	16-49	53	9-34	35	22
Manitoba . . .	168	125	59-74	34	14-20	40	10-24	10	6
Ontario	289	209	61-72	66	15-23	43	7-15	12	4
Quebec & Labrador . .	269	196	65-73	78	22-29	22	4-8	74	27
New Brunswick .	31	13	6-42	13	13-42	23	26-74	1	3
Nova Scotia . .	32	11	6-34	27	22-84	19	3-59	5	16
TOTAL	1524	1083	52-71	470	17-31	335	8-22	290	19

The figures given in Table 1 are the numbers of squares overlapped by observers reporting various states of abundance. Prince Edward Island has been omitted owing to the large influence of fox farming activities on the snowshoe rabbit population. The percentages are relative to the total number of squares covered in each province. The higher figures are the crude figures, the lower ones the figures corrected for overlapping between different categories of answer. As already explained in previous reports, this overlapping is partly apparent, owing to the method of using the grid, and partly due to real differences of opinion. The true value lies somewhere between the two given. The large amounts of overlap in some provinces are striking, and have already been referred to. They probably give some measure of the degree to which the rabbit population is reaching its peak. An area

north of Churchill has been included in Manitoba and not the North-west Territories in order not to distort the results. The total area of grid covered this year was some 1,370,000 square miles. The actual area covered by observers was probably less than half this. However, an intelligence system covering even half a million square miles must give a very good sample of the snowshoe rabbit population of Canada. The percentage of squares in which epidemics were recorded was 19%, which is very close to the figure of 18% given below for the Hudson's Bay Company posts alone.

Analysis of the Hudson's Bay Company reports gives the following interesting comparisons. These are worked out using the numbers of posts, without allowing for the different areas covered by them.

TABLE 2.

Year	Total	Number of posts reporting					
		Increase		No Change		Decrease	
		Total	Epidemic	Total	Epidemic	Total	Epidemic
1932-33	119	109	18	4	0	6	1
		92%	15%	3%	0	5%	1%
1933-34	121	84	13	8	0	29	9
		69%	11%	7%	0	24%	7%

The epidemic percentages are relative to the total number of posts.

The percentages of all posts reporting epidemics were 16% and 18% in the two years. The relative drop in posts reporting increase in the two years was 25%, which was probably caused by the 16% of epidemics, together with some probably unnoticed outbreaks indicated by the "decrease, no epidemic" reports.

For detailed study the original maps and questionnaires should be consulted. Copies of these are being deposited in the National Parks Branch at Ottawa, and in the Bureau of Animal Population at Oxford.

Corrections to Snowshoe Rabbit Enquiry
1932-33.

pp. 74-75. The area covered by National Park

Branch observers mapped on a grid is given as 640,000 square miles and later as 512,000 square miles (the latter excluding Prince Edward Island). The second figure is an error, and the actual areas of observers mapped by planimeter were therefore about 43% of the grid area, not 54% as stated.

- p. 75. Right-hand column. In both places "National Parks" refers to the results of the National Parks Branch enquiry for all Canada, (omitting Prince Edward Island).
- p. 78. Right-hand column. "Decline in fine fur." This refers to the *area* in which furbearers occur, not to the curve for all Canada's fur production. The progressive decline in *area* of increase will only affect the *total returns* after one or two years.
- pp. 77-78. In tables 1 and 2 "Quebec" includes the Newfoundland Labrador.

CHARLES WENDELL TOWNSEND

1859 - 1934



IN THE DEATH, on April 3, 1934, of Charles Wendell Townsend, M.D., of Ipswich, Massachusetts, *The Canadian Field-Naturalist* suffered the loss of a staunch supporter, one who, in common with many other naturalists resident in the United States, had done much to make known the natural history of Canada, as well as that of his own country.

Born in Boston, Massachusetts, November 10, 1859, the son of Thomas Davis and Frances Barnard (Smith) Townsend, he received his education in New England, graduated from Harvard College in 1881, and received the degree of Doctor of Medicine in 1885, at the completion of his course in Harvard Medical School. In his student years he showed much interest in natural history and published one or two brief

notes on topics relating to it, but after entering his medical practice he gave full attention for some years to his profession and was inactive as a naturalist.

In 1891 he married Gertrude Flint and in 1892 built a summer home at Ipswich, Massachusetts, which became thenceforth the center of his re-awakened activities in associating closely with nature and in observing and recording in detail its varied aspects. Although there was no field of natural history that did not appeal to him, he was especially interested in bird life.

A new period in his career as naturalist and ornithologist began in 1906, when, in company with Dr. Glover M. Allen, with whom he subsequently became co-author of the very important paper entitled *Birds of Labrador*, he made a summer journey by mail steamer along the Atlantic coast of the Labrador Peninsula. During that journey the charm of the vast and little-known areas of the north laid its hold upon him, as it has upon many another. Acknowledging the spell, he made, in 1909, 1912, 1915, and 1928, repeated visits to the Labrador country, where it borders upon the Gulf of St. Lawrence. In intervening years, as opportunity offered, he paid extended summer visits to other regions in eastern Canada, such as Grand Manan, the valley of the Saint John River, New Brunswick, various parts of Nova Scotia, and the Gaspé Peninsula of Quebec. On these journeys he never failed to observe his surroundings, especially the bird life, with care and pleasure. Annotated lists of birds observed, which appeared chiefly in *The Auk* and in *The Canadian Field-Naturalist*, and several charming narrative volumes of general interest, which were published from time to time, form permanent and valuable contributions to our knowledge of the regions mentioned.

His principal papers in the files of *The Canadian Field-Naturalist* are:

"Notes on the Summer Birds of the Gaspé Peninsula, Province of Quebec" (1920),

"The Summer Birds of Advocate, Cumberland County, Nova Scotia" (1922),

"Additional Notes on the Birds of the Gaspé Peninsula" (1923).

During his earlier visits to the southern coast of the Labrador Peninsula, Dr. Townsend was much impressed with the need of prompt and effective conservation measures, including the establishment of a number of bird sanctuaries, to put an end to excessive and wasteful destruction of wild life in that region and to ensure the continued existence of the interesting local bird life, particularly the valuable Eider Duck. He published several vigorous and well-reasoned articles on this subject and undoubtedly laid much of the foundation for the conservation measures now in force in that region.

In the course of his visits to southern Labrador, Dr. Townsend also formed the acquaintance of the late Napoleon A. Comeau, the veteran naturalist, sportsman, magistrate, and practical medical helper, of Godbout, Quebec, in whom he found a most enjoyable companion, able to furnish him with much information of interest and value.

Dr. Townsend's first wife died in 1917 and in 1919 he married Sarah G. Flint, who died in 1924.

In the later years of his life, having retired from the practice of medicine, he was able to carry out long-cherished plans for travel and study. He made a leisurely journey around the world and, on other journeys also, paid visits to distant lands.

Endowed with a strong, positive nature and a generous heart, with which were joined a keen interest in his surroundings, a lively sense of humour, and a great capacity for activity of mind and body, he was a delightful companion who made any field-trip in his company memorable. — H. F. L. (with assistance of G. M. A.).

NOTES ON THE ARCTIC FAIRY SHRIMP, *Branchinecta paludosa**

By M. S. FERGUSON

*. Contributions from the Zoological Laboratory of the University of Illinois, No. 445.

THE WRITER has recently had the opportunity of examining and identifying specimens of fairy shrimps taken during the past summer in the Hudson's Bay region by Mr. Douglas Leechman, National

Museum, Ottawa. These specimens were identified as belonging to the widely distributed Arctic species *Branchinecta paludosa* (Müller, 1788). The first collection was made on July 26th, 1934, near an Eskimo camp on the beach at Lake Harbour, Baffin Island. The second group was obtained from shallow pools among the rocks at Churchill, Manitoba, on August 20th, 1934.

The genus *Branchinecta* contains approximately fifteen species, five of which occur in North America. Representatives of this genus are found in every continent except Africa, and in the circumpolar regions of the north and south (Creaser, 1931; Gajl, 1934). *B. paludosa* is probably the most widely distributed species of fairy shrimp, since it has been collected in North America, Europe and Asia. The most northerly record of this form is from collections made at Discovery Bay, Greenland ($81^{\circ} 40'$).

Johansen (1921) gives a general account of *B. paludosa* in North America and the adjacent polar regions. From personal observations, and after a review of the literature, he reports that this fairy shrimp might be assumed to occur over most of Alaska, the Yukon Territory and the Canadian Archipelago. Every record of *B. paludosa* in Europe and Asia has been from areas north of the 60° parallel with the exception of specimens from Dwoisty Lake, in the Tatra Mountains. This Polish lake is situated on parallel $49^{\circ} 14'$, and at an altitude of over 5,000 feet.

Gajl (1934) made a careful study of the fairy shrimps from Dwoisty Lake (Twin Lake). He compared these specimens with forms from Scandinavia, Russia, Greenland and Alaska and found approximately forty morphological differences. He evaluated these differences and then decided that the former represents a new species, which he designated as *B. polonica*.

B. paludosa is considered to inhabit lowland pools. However, Johansen (1922) reports this fairy shrimp as occurring in the Dovre and Kiolen mountains, Scandinavia, and at White Horse, Yukon Territory, at altitudes of 2,500 and 2,000 feet respectively. In the United States, the mountain species *B. coloradensis* Packard (1874) has been found in pools at elevations of over 12,000 feet.

It is possible that both *B. polonica* and *B. coloradensis* are species whose isolation took place during the glacial period. Creaser (1931) does not believe that these mountain forms are any nearer in relationship to *B. paludosa*, of the Arctic, than they are to the species of *Branchinecta* found elsewhere in the world. From the results of Gajl's work it seems fairly certain that, as yet, there are no authentic records of *B. paludosa* from Eurasia below the most southerly Scandinavian record ($62^{\circ} 20'$). The fairy shrimps found at elevations of over 2,000 feet in the Yukon Territory and in Scandinavia, in all probability, belong to the species *B. paludosa*, since these areas lie north of the 60° parallel. Future studies will throw light on this point.

In North America *B. paludosa* has been collected across the entire continent north of latitude 60° (Johansen, 1922). South of this line, these fairy shrimps have been collected at Hamilton Inlet, Labrador ($54^{\circ} 0'$); Fort Chimo, Ungava, Quebec ($58^{\circ} 9'$); Point St. Charles, Quebec ($45^{\circ} 31'$) and at Churchill, Manitoba ($58^{\circ} 44'$).

The *B. paludosa* from Point St. Charles (near Montreal) were collected during the period May to June, over thirty years ago in a pond cut off from the river. This form has never been taken in that area since and it is thought that possibly eggs were transported there from the arctic regions through some undertermined agency.

From all the authenticated notes the writer has been able to find and with the exception of the foregoing record, it appears that Hamilton Inlet, Labrador, is the most southerly location in North America from which *B. paludosa* has, as yet, been reported. Future collections may show that this fairy shrimp occurs in northern Ontario and corresponding points in Quebec.

Due to the late thawing of the Arctic ice, the eggs of *B. paludosa* do not hatch until June (Johansen 1921). The eggs are frozen in the ice during the winter and hatch into the nauplii shortly after melting occurs. It has been noted by the writer that some of the eggs of *Eubranchipus bundyi*, a fairy shrimp widely distributed in North America, hatch the very day that the ice at the edge of the pools begins to melt. In the case of *B. paludosa* sexual maturity is attained by the middle of August. The female specimens taken by Mr. Leechman on July 26th were definitely immature when compared with those taken on August 20th. Johansen (1921) states that the eggs are laid during late August and early September, after which time the water usually freezes. Consequently, those fairy shrimps are killed which have not already died. When these forms occur in deep pools they may live for some time under the ice, specimens having been collected by Halkett early in November, 1903.

The biology of few Anostracan phyllopods has been studied in detail. The average life of *B. paludosa*, as reported by Sars and Johansen (Johansen, 1921), is probably about four months. Due to the short open season in the north, many of the pools containing these fairy shrimps do not dry up. Consequently, large numbers of the phyllopod eggs never become desiccated. The fairy shrimps of the more temperate regions generally occur in temporary ponds, so that the eggs are subjected to drying. It is not definitely known what environmental conditions are required by eggs of each individual phyllopod

species before hatching takes place. However, the writer has evidence which tends to show that desiccation of the eggs is necessary in some of the North American species. Among these species there are at least two, apparently distinct, groups. In the first group the eggs hatch when the fall rains set in; while in the other hatching takes place only after the eggs have been subjected to freezing temperatures for some time.

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REVIEWS

IDENTIFICATION OF THE COMMERCIAL TIMBERS OF THE UNITED STATES.—By H. P. Brown, Ph.D., and A. J. Panshin, Ph.D., \$3.00, 6 x 9¼; 223 pp. The McGraw-Hill Book Company, Inc., New York and London, 1934.

The Drs. Brown and Panshin believe in furnishing complete illustrations with their books on the identification of timbers. Their most recent publication of this nature on woods of the United States lists no less than 60 full page plates containing 274 figures.

All these figures, except half a dozen photographs of wood surfaces, are photomicrographs of wood sections. Some 15 plates show transverse sections of wood at low magnification (5 diameters), and 43 others show transverse and tangential sections magnified 75 diameters. The rest of the plates and miscellaneous text figures illustrate general and particular items of wood anatomy.

The low-power photomicrographs include 26 coniferous species and 56 broad-leaved species, while at the higher magnification the ratio is 28 to 58, enough to illustrate the most important timber species or groups together with plenty of the less important woods and far exceeding the number of such illustrations in other similar books.

The text consists of an introductory portion followed by two keys for identification of the various woods and, finally, an itemized description of the woods by species.

In the brief space of 25 pages, the authors present the introduction to anatomical characters of wood and undertake to define, with illustrations, their technical terminology.

The first identification key is based on features of wood discernible with the naked eye and the aid of an ordinary pocket magnifying glass. Also, instances are noted where the odour and weight of wood assist in identification. The second key is based on minute characters. Both keys, with appropriate plates interspersed, are contained in 59 pages.

The descriptions of wood by species (pages 91 to 164) itemize significant properties of the various timbers that may be of use in identifying specimens. In this section, diameter measurements of the cells composing the various woods are listed. Such information may be essential in identifying small slivers of wood and no other publication on American woods presents so complete a list of cell measurements.

Following this come 43 full-page plates, a glossary, and an index.

This volume, which has been carefully printed on coated paper in easily readable type, is the first to appear of a projected American Forestry Series, intended (to quote from the book's jacket) "for the college student, the practicing forester, and men in the forest industries". However, as the authors of the book state in their preface, "even the layman .. should be able to use this information to advantage".

According to the Chinese proverb that a picture is worth a thousand words, the authors' illustrations are equal to some 700 printed pages or rather more than three volumes of the size and type employed for their book. Add to this the authors' offer (page 27), to supply readers on request with information on the technique of preparing mounts of wood for use with a compound microscope and, from being a good buy, the book becomes a college education.

The authors are distinguished members of the Department of Wood Technology of the New York State College of Forestry at Syracuse.—J. D. H.

SOME COMMON BIRDS OF NOVA SCOTIA, by *Robie Tufts*, with *Illustrations in Colour*. Kentville Publishing Company, Kentville, Nova Scotia, 1934.

An attractive little publication of some 88 pages, bound in good blue waterproof fabric with gold lettering, presenting some fifty of the most conspicuous birds of field and garden to the growing public of amateur bird students. Most of them are illustrated in colour. General appearance, nesting habits, migration dates and

a statement of their place in economics and æsthetics are briefly but succinctly given. The book closes with a number of notable bird poems from various sources, even including a translation from the Chinese, and a list of all the birds known to have occurred in the Province. A feature worthy of remark is a charming little drawing of juvenile Song Sparrows on the cover and ornamenting the fly leaf by which a new, and perhaps coming, bird artist, Ronald Smith, makes his bow to the public. We can expect to hear more of this young man.

The author's long experience in Nova Scotian ornithology both in the field and on the lecture platform had given him a full understanding of his public's tastes and requirements as well as good matter to satisfy them and adequate methods of presentation. His job is admirably done.

The book is all on good, well-surfaced paper and the typography and proof reading are excellent. The only regret is that the register of the colour plates is not up to the standard of the rest of the printing and does not do justice to the plates used.

Altogether the work is well conceived and executed and will undoubtedly be deservedly popular among the bird lovers of the province.—P.A.T.

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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No. 6

G. A. MILLER

1862 - 1935



HOSE privileged to know Mr. G. A. Miller felt a keen sense of loss when he passed away on February 26th. His illness of several months may have lessened the shock. It did not soften the blow.

Mr. Miller was born near Barrie, Ontario, in 1862. His parents, the late Alexander and Christina Miller, were of Scottish extraction. He leaves his widow, formerly Margaret Benning, two daughters: Miss Helen Miller, teaching at the Cornwall Collegiate Institute, and Miss Anna Miller of Queen's University, and one son, Harold, of Fort Wayne, Indiana.

Respect and admiration impel one to write freely about Mr. Miller's great qualities of heart and mind. Restraint is imposed by the memory of his modesty. After a brilliant course at

Queen's University he graduated with distinction, receiving the gold medal in botany. These academic honours were, however, but incidental in a life of continuous intellectual growth. His experience as teacher and principal in the elementary and secondary schools of Ontario was a wide one. In 1914 he resigned the principalship of Seaforth Collegiate Institute, a school of well-deserved reputation, to become science master at the Ottawa Normal School. During his eighteen years in this position he communicated to many hundreds of student teachers his deep interest in natural history. He served as a member of council in the Ottawa Field-Naturalists' Club and in 1925 became President. During his editorship of *The Canadian Field-Naturalist* he did much to promote the scientific standing of the journal.

In an age of specialists Mr. Miller was remarkable for the broad scope of his interests, achieved without incurring the common penalty of superficiality. His loss to education and natural history is a severe one. Men of his calibre are few. Yet it is hardest to bear the snapping of many homely elemental strands of human relationship, strands of unsuspected strength unwittingly spun in the commonplace

activities of every day. His was a life of dignity and serenity, a deep stream, untroubled by fretful and revealing shallows, beset with no treacherous or contrary current. He was kind. He respected the personality and reserve of a child as he did those of grown men. As a welcome guest he entered the heart. His place will remain. — HENRY BOWERS.

FAUNA OF THE BLACK RIVER GROUP IN THE VICINITY OF MONTREAL

By VLADIMIR J. OKULITCH, Ph.D.



AN EXTENSIVE collection of fossils from the Black River beds in the vicinity of Montreal was made by the author while working for his doctorate at McGill University. This material, together with fossils collected by many persons during the past fifty years, completely identified and labelled, is now deposited in the Peter Redpath Museum. Most of the specimens were obtained at the Montreal Construction Co. quarry near St. Vincent de Paul, at Devito and Golf Course quarries at Pointe Claire, and at the Martineau quarry in Montreal.

The Black River Group in the vicinity of Montreal includes three formations, the Pamela, Lowville, and Leray. The Pamela is 10 feet thick and consists of impure dolomitic and shaly limestone; the Lowville is 16 feet thick and is fine grained, oölitic, dove-coloured, thin-bedded limestone with numerous shaly partings; the Leray is 22 feet thick and consists of thick beds of black, light-weathering limestone, containing nodules of chert and irregularly horizontal streaks of brownish, sandy material. The Lowville and Leray formations are abundantly fossiliferous, but the Pamela is almost barren.

I wish to extend my appreciation and thanks to Prof. T. H. Clark for his advice and help, which made the completion and publication of this paper possible; to Prof. P. E. Raymond for his reading and helpful criticism of the manuscript, and to my wife for making the drawings of new species of fossils.

SYSTEMATIC PALAEONTOLOGY.

ANTHOZOA.

Fossil corals are very numerous in the Black River of this vicinity, but the number of species is small. Some of them, such as *Tetradium cellulosum*, *Streptelasma profundum* and *Columnaria halli*, are among the best index fossils for the Black River. Others, such as *Columnaria alveolata*, and *Streptelasma corniculum*, are better known in the Trenton, and their occurrence in the Black River is an indication of

the close similarity between the Black River and Trenton faunas. Most of the forms in the local Black River are also known in the Black River of the Ottawa valley, and close similarity exists between the coral fauna of Paquette Rapids and that of the vicinity of Montreal. One new species of *Tetradium* is herein described, but the imperfection of our present subdivision of the genus *Tetradium* into species is fully realised, and it is hoped that careful revision of the species on a more logical and natural basis than merely by the differences in the habit of growth can be made.

Tetradium is a very common fossil in the Lowville of Montreal and vicinity. Except for a single specimen of *T. minus*, the genus is not represented in the Léray. As *Tetradium* has not been observed in the local Chazy, it can be considered, for practical purposes, to be confined to the Lowville hereabouts. It first appears about 5 feet above the base of the Lowville, and is found in almost every higher bed until the top of the formation is reached.

Tetradium clarki n. sp.

Plate 2, figs. 1a, b, c.

Corallum irregularly hemispherical, formed of branching quadrilateral or petaloid tubes. The tubes or corallites are joined into intersecting and anastomosing "laminæ" made of several (2-8) layers of tubes united along the whole of their adjoining sides. The general arrangement is similar to that of *T. halysitoides* Raymond (Lower Lowville, Carden, Ont.) the difference being in the number of corallites in each layer.

A fuller description of this species will be given in a forthcoming paper on Tetradiæ.

Horizon and locality: Lowville of St. Vincent de Paul and Pointe Claire, Quebec.

Name in honour of Professor T. H. Clark of McGill University.

BRACHIOPODA.

The assemblage of brachiopods of the Black River group in the vicinity of Montreal has

much in common with that found in Eastern Ontario and localities further west. There are, however, some differences, one of the most obvious of which is the relatively smaller size of the Montreal fossils. For instance, the familiar *Rafinesquina alternata* ordinarily has a hinge width of 40 mm. or more; in the local specimens this seldom exceeds 30 mm.; that is, it approaches the hinge-width of normal specimens of *R. minnesotensis*. *R. minnesotensis* in turn reduced to a width of about 20 mm. at the hinge. Similar reduction in size seems to be common to all the brachiopods studied, for, disregarding a few exceptions, the fossils attain only about three-quarters their usual size. The reasons for this diminution in size are not apparent. It may perhaps be due to unfavourable climatic conditions, or to turbidity of water. The latter explanation is suggested by the rather frequent shaly partings and occasional sandy layers in the limestone. That such conditions as a rule are unfavourable to brachiopods seems certain, since the shells are found in abundance only in the more massive and pure limestone beds, and are scarce in most of the shaly layers, even where such layers contain numerous corals and bryozoa. An exception to this is *Zygospira recurvirostris* which is found almost exclusively in the muddy beds. A few specimens of *Rafinesquina grandis* n. sp. and an occasional *Strophomena incurvata* also occur in the shaly layers. The presence of *R. grandis* in such an environment shows that some at least of the Strophomenidae were not only able to adapt themselves to muddy waters, but apparently to flourish, for specimens of this species attain a large size. The preference of brachiopods for clearer waters, and possibly also for more uniform conditions of depth, currents, etc., is in all probability the reason for their relative abundance in the Leray, at every locality studied, as contrasted with their paucity in the thin-bedded Lowville. The Trenton affinities of the Black River brachiopods are just as marked in Montreal as they are near Ottawa and elsewhere.

Pionodema sinuata n. sp.

Plate 1, fig. 8.

Shell small, the pedicle valve of the holotype being 9 mm. long, and 12 mm. wide. It is gently convex, with a broad sulcus occupying at least one-third of the width of the anterior part. The sulcus begins about midway of the length and increases in depth rapidly. The widest part of the shell is at the hinge, which is nearly straight. The brachial valve is not known. The surface of the pedicle valve is covered with fine, rounded, radiating costellæ, increasing by interpolation, which takes place twice. About 50 costellæ per cm. are present

near the anterior margin. Very fine concentric lines cover the entire surface. The beak is not prominent. The shell is irregularly punctate. Interior is not known.

This species differs from all varieties of *P. subaquata* (Conrad) in having a nearly straight posterior margin where it is widest. Differs from *Doleroides* in having a punctate shell.

Horizon and locality: fairly common in the Leray at St. Vincent de Paul and Pointe Claire, Que.

Rafinesquina clara n. sp.

Plate 1, fig. 1.

Shell subquadrate; the width of the holotype at the hinge is 23 mm., length 22 mm. Cardinal extremities have an angle of 90°. Valves concavo-convex, almost flat, with a gentle increase of curvature at the anterior margin. For the first quarter of the length the sides are practically straight, beyond this the outline is uniformly rounded. Beak small, not prominent, surrounded by a narrow depressed area. The surface of the valve is somewhat irregularly wrinkled, covered with narrow radiating costellæ (over 40 per cm. at the anterior margin) crossed by very fine crowded concentric lines, giving the surface the appearance of a woven fabric, thus reminding one of that of *Strophomena incurvata* (Shepard). Radiating costellæ increase in number by bifurcation on the pedicle valve.

Differs from *Rafinesquina alternata* (Emmons) in absence of alternating fine and coarse costellæ, in possessing finer costellæ, and its approximation of a quadrate outline.

Horizon and locality: common in the Leray of Pointe Claire, Quebec.

Name derived from type locality.

Rafinesquina transitionalis n. sp.

Plate 1, fig. 3.

The shell is geniculate; length and width are the same. The largest individual (holotype) is 26 x 26 mm., a smaller shell, 22 x 22 mm. Umbonal region is flat, sharply deflected towards the anterior margin at about one-half of the length from the beak. In younger individuals the geniculation is closer to the anterior margin. Shell is noticeably narrower in front, but not as much so as in *R. deltoidea* Conrad. Beak is not prominent, hinge almost straight. Cardinal angles are almost equal to 90°. Radial costellæ are slender, rounded, and have a tendency to alternate with coarser ones. Concentric lines are very narrow, giving the surface of the shell a woven appearance. Shell structure is punctate.

This species differs from *R. deltoidea* (Conrad) in being less inflated, and in not being so triangular in shape; it differs from *R.*

alternata (Emmons) in being more triangular, in the absence of definite alternation of costellæ, and in the rather abrupt geniculation. The younger individuals approach the general shape of *R. alternata* more than do the larger specimens. *R. præcursor* Raymond is more triangular, although it approaches this species very closely. It seems that the species under discussion is transitional between *R. alternata* and *R. deltoidea*, and may be considered as a Black River ancestor of the latter species.

Horizon and locality: upper Lowville and Leray at Pointe Claire.

Rafinesquina grandis n. sp.

Plate 1, fig. 2.

The dimensions of the holotype are: width, 48 mm.; length, 30 mm.; depth, 12 to 16 mm. (pedicle valve). The pedicle valve is strongly curved along the median line. The maximum curvature occurs near the umbo at a point approximately one-fifth of the way along the length of the shell. It is not geniculate and the rate of curvature gradually decreases towards the anterior margin. Brachial valve unknown. The pedicle valve has definite cardinal wings, which are practically flat and so give the lateral margin a somewhat resupinate appearance. The alar angle is about 70°. The shell is punctate. The puncta have a tendency to be regularly arranged, and when so, occur in grooves between the costellæ; however, there is considerable variation in this. The costellæ are narrow, rounded, and increase by interpolation on the pedicle valve. The variation in coarseness is not very conspicuous, being best displayed on the convex part of the shell, where it resembles that of *R. alternata*, but is entirely lacking at the margin. Number of costellæ varies in the medial area and at the cardinal extremities, being 24 per cm. at the margin in the median area, and 32 per cm. at the margin near the cardinal extremities. Costellæ are crossed by numerous fine, crowded, concentric lines.

Differs from *R. alternata* (Emmons) in the absence of definite alternation of fine and coarse costellæ, in the convexity of umbonal region and greater gibbosity. Differs from *R. deltoidea* (Conrad) in being more uniformly rounded and neither triangular nor geniculate. From *R. camerata* (Conrad) it differs in having cardinal wings and a greater size.

Horizon and locality: Lowville of Pointe Claire, and Leray at St. Vincent de Paul, Que.

Rafinesquina wagneri n. sp.

Plate 1, fig. 5.

Shell moderately convex and uniformly rounded. Dimensions of the holotype are: width, 24 mm., length, 16 mm., depth, 7 mm. (pedicle valve). This species is exceedingly finely costel-

lated there being 56 costellæ per cm. near the anterior margin; the costellæ alternate in coarseness, the number of narrow costellæ between single coarser ones varying from 4 to 7. Narrow, crowded, concentric lines give the surface a finely woven appearance. Greatest curvature of the shell is at about two-thirds the length from the beak, but the change in slope is not sufficiently abrupt to be called a geniculation. The shell is almost flat from the beak to this region. The angle between lateral margin and hinge is approximately 90°.

Differs from *R. alternata* (Emmons) in size, fineness of costellæ and convexity. It is not as gibbous as *R. camerata* (Conrad) and has a different proportion of length to width, *R. camerata* being more nearly square.

Horizon and locality: Leray at St. Vincent de Paul, Que.

Specific name in honour of Prof. Julius Wagner of Belgrade, Yugoslavia.

Rafinesquina williamsi n. sp.

Plate 1, fig. 6.

The shell is very globose with an average width of 25 mm., length 22 mm., and depth, 10 mm. (pedicle valve). The convexity of the pedicle valve is not quite uniform, but has a pronounced break about half way along the length, where the curvature is increased. There is also a less pronounced change in the curvature about 3 mm. in front of the beak. There is a definite demarcation in convexity between the umbonal region and that of the anterior part of the shell. The less convex posterior region occupies about one-half of the surface. Near the cardinal extremities it is not very convex. The change in curvature along the median line is not as gradual as in *R. robusta* Wilson, but is more uniform than in *R. deltoidea*. The shell is irregularly punctate and the costellæ resemble those of *R. alternata*. However, there is not as much contrast between fine and coarse ones. All are crossed by fine concentric lines. The lateral and central muscle scars radiate from a point immediately beneath the beak. The scars are visible as narrow grooves, and are about 5 mm. long. The outer lateral grooves make an angle of about 90°, whereas the central scars make an angle of about 30°. The entire area, therefore, appears as a triangle, separated into three equal triangular areas. The cardinal (pedicle) scars are not visible. The beak is not prominent.

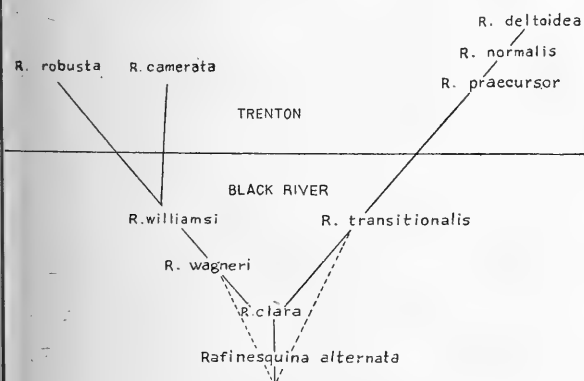
This shell differs from *R. deltoidea* (Conrad) in general shape and curvature along the median line; it differs from *R. robusta* Wilson, by a different ratio of length to width (35:40 mm.) in size, and curvature along the median line. In all probability *R. williamsi* is transitional between *R. wagneri* (local Leray) and *R. camerata* (Conrad) - (Trenton of Ontario).

Horizon and locality: Leray at St. Vincent de Paul, Que.

Specific name in honour of Prof. M. Y. Wilams of the University of British Columbia.

EVOLUTION OF *Rafinesquina*.

Dr. Alice E. Wilson (1932, b. p. 397.) attempted to trace the evolution of *Rafinesquina*. The new species of this genus found in the Black River of Montreal suggest a slight modification of her evolutionary series. The appended diagram illustrates the evolution better than a lengthy description. Two lines appear to start from *R. alternata*. In one, terminating in *R. robusta* and *R. camerata*, the rather flat umbonal region becomes convex. This line is represented by *R. wagneri* n. sp. and *R. williamsi* n. sp. The other line of evolution terminates in *R. deltoidea* which retains the flattened umbonal region, although it is reduced in area. The anterior part of the shell shows a pronounced geniculation. This line is represented by *R. transitionalis* n. sp., *R. præcursor* Raymond, and *R. normalis* Wilson. *R. clara* n. sp. differs from *R. alternata* by a slight increase of curvature at the margin, and seems to be the first step leading from the flat *R. alternata* to the more convex forms.



Strophomena corrugata n. sp.

Plate 1, fig. 7.

Shell resupinate, slightly concavo-convex, with the anterior part strongly deflected. The holotype has a width, 28 mm., length, 19 mm. The shell is semi-circular, with rectangular cardinal extremities. The margin is somewhat crenulated. It is wrinkled by two or possibly more concentric undulations, particularly prominent at the middle. The beak is inconspicuous. On the surface there are radiating costellæ, narrow and rounded, increasing by interpolation. There are 40 of these per cm. at the margin. The costellæ are crossed by fine, raised, concentric growth lines. The interior of the shell is not known. It differs from *S. irregularis* Wilson in having

wrinkles, coarser costellæ, greater convexity, and no alteration in coarseness of its costellæ. *S. incurvata* (Shepard) has finer costellæ, much more closely packed, and greater convexity.

Horizon and locality: Leray of St. Vincent de Paul, Quebec.

Leptæna radialis n. sp.

Plate 1, fig. 9.

The shell is small, transversely semi-elliptical. Its greatest width at the hinge is 11 mm. length, 7 mm. The pedicle valve is sharply geniculate; the down-bent anterior part crenulated by numerous radial folds; the disc is slightly convex, without prominent concentric wrinkles. The geniculation is about two-thirds of the way from the beak to the margin. Along the border of the flat disc there are several small pits, apparently representing interruptions in a single concentric wrinkle just at the line of geniculation. The beak is inconspicuous and only slightly raised. Only the pedicle valve is known; its surface is covered by very fine, crowded radial costellæ, crossed by still narrower concentric lines.

The specimen belongs to the group of *Leptænas*, which do not have strong concentric undulations. Other members of this group are *L. unicostata* Meek and Worthen and *L. charlottæ* Winchell & Schuchert. *L. radialis* differs from these in the presence of radial wrinkles on its geniculate portion, and pits along the line of geniculation. Known only from the holotype.

Horizon and locality: Lower Leray at St. Vincent de Paul, Que.

THE PELECYPODA.

Pelecypods are fairly numerous in the Lowville of this vicinity, particularly in the so called "black bands" or shaly partings. Usually they occur as casts of the exterior and so do not preserve any indications of hinge structure or muscle scars; seldom even surface makings. Specific determinations must be based upon the general shape of the shell, which is the only diagnostic feature to be seen. Two species of *Cyrtodonta* were definitely recognised, *Cyrtodonta subcarinata* and *C. huronensis*; both species have been listed from Pointe Claire but because the original descriptions are somewhat difficult to obtain it seems advisable to repeat them below.

Cyrtodonta huronensis Billings.

Billings, Geol. Survey Canada, Rept. of Progress p. 180, figs. 3, 4. 1857.

"Description — Transversely oval; anterior and posterior extremities rounded; ventral margin moderately convex, dorsal margin a little more convex than ventral; umbones rather small, incurved; greatest tumidity extending from the umbones obliquely towards the posterior ventral

angle; surface concentrically marked with fine striæ and ridges of growth. Width one inch five lines [36 mm.]; length at the centre, one inch.

"Locality and formation — The specimens were originally described from an island in the group lying off Point Palladeau, Lake Huron, where they were found associated with Chazy, Black River and Trenton fossils [N. B. probably all Black River] also at Pointe Claire, Island of Montreal."

Our specimens were all collected from the Lowville of the Golf Course and Devito quarries, Pointe Claire.

Cyrtodonta subcarinata Billings.

Billings, Geol. Surv. Canada, Rept. of Progress, p. 181, 1857.

"Description — Transversely sub-oval; ventral margin scarcely convex, straight or slightly sinuated for a small space of the centre; dorsal margin elevated in the centre and sloping with a slight curve towards the posterior end, which is narrowly rounded or truncate in the casts of the interior; umbones moderately small, incurved, and somewhat carinate for a greater or less distance; surface marked with obscure concentric ridges of growth. The interior has not been seen. Width one inch three lines; [31.5 mm.] length nine lines [18.5 mm.]."

"This species may perhaps be considered a variety of the last; but the proportions are somewhat different, and it is always characterised by the strong rounded carina, which extends from the umbones to the posterior ventral angle."

"Locality and formation — Occurs at Pointe Claire and in numerous localities in the valley of the Ottawa, in the top of the Chazy, throughout the Birdseye and Black River limestones, and in the base of the Trenton."

Our specimens were all collected from muddy or shaly beds of the Lowville of St. Vincent de Paul and Pointe Claire, Que.

GASTROPODA.

The gastropods of the Black River beds in the vicinity of Montreal form a characteristic group, and are distinct from either the Chazy or Trenton forms.

Unfortunately they are badly preserved. The majority of the shells are rather imperfect casts of the interior, whose crystalline condition renders extraction from the rock almost impossible. However, fairly good specimens can be found if one looks carefully, and some show enough of the surface markings to permit specific determination. The shells are about the same size as typical specimens from other localities, showing no tendency to such dwarfing as was noted in case of the brachiopods. Several general observations can be made. The gastropod fauna of the Black River represents a fairly distinct group, the majority of the species being limited

to the formation. This is particularly striking if we omit from consideration such common and long lived species as *Hormotoma gracilis* and *Lophospira bicincta*. However, the affinities of the Black River gastropods are with those of the Trenton rather than with those of the Chazy. It is also apparent that within the Black River group certain species are confined to the Lowville, and others to the Leray. Thus *Hormotoma subangulata*, *H. wilsoni*, n. sp., *Liospira micula* and *L. vitruvia* have been found only in the Upper Leray, whereas *Lophospira perangulata* and *Trochonemella montrealensis* gen. et sp. nov. are found only in the Lowville. The abundant *Hormotoma gracilis* is more common in the Leray than in the Lowville.

It will also be noticed that fossils are more abundant in the upper portion of both the Leray and Lowville than in their lower layers. No other explanation of this peculiarity is apparent than that the basal strata of both Lowville and Leray consist of massive and sandy beds, whereas shaly partings become more common towards the top.

Dr. Raymond, (1913, p. 148) mentions that Pointe Claire is a typical locality for *Lophospira daphne* (*L. arachne*), but this species is not represented in our collection. *Maclurites logani* has been found only in Martineau quarry, Montreal.

Homotoma wilsoni n. sp.

Plate 2, fig. 4.

Shell high, slender, consisting of about 8 rounded or sub-angular whorls. General appearance much the same as that of *Hormotoma gracilis* (Hall), the difference being in the apical angle, which varies from 10° to 14°, whereas in *H. gracilis* the apical angle constantly measures 18°. The available specimens are not perfect enough to show the umbilicus and surface markings, but these are presumably the same as in *H. gracilis*.

Horizon and locality: Middle Leray at St. Vincent de Paul, Que.

Specific name in honour of Dr. Alice E. Wilson of the Geological Survey of Canada.

Liospira peneplana n. sp.

Plate 2, fig. 3.

The shell is small, discoidal, about 15 mm. wide and 6 mm. high. There are about four volutions; the last whorl and a half lying almost in the same plane. The sutures are very shallow, hence the spire projects slightly above the almost uniform slope of the last two whorls. The apical angle is 135°. The slit-band occupies the periphery, and is very narrow, giving a sharp-edged appearance to the shell. The holotype does not show surface markings. This species resembles closely *Liospira micula* Hall, but differs in having a greater apical angle.

Horizon and locality: Lowville at Pointe Claire, Que.

Trochonemella gen. nov.

The proposed genus embraces those shells which Ulrich classed as the *trochonemoides* section of *Lophospira*, and a new species from the Lowville.

Ulrich described the *trochonemoides* section as: "In all respects like *Trochonema* save that the supra-peripheral keel bears a distinct band. Differs from ordinary types of *Lophospira* in the relatively depressed form, large umbilicus, thick shell, and oblique-mouth." (Ulrich, 1897, p. 964.) Farther on describing *Lophospira* (?) *notabilis* the same author said: "The most striking feature of this remarkable shell, and one that distinguishes it at once from every one of the host of Lower Silurian *Pleurotomaridæ* known to us, is the coarsely marked slit-band. This, as well as the form of the aperture and in fact, the general aspect of the whole shell, is so different from the usual type of *Lophospira* that, if we had not at the same time seen *L. knoxvillensis*, and *L. trochonemoides* which, while having the usual *Lophospira* band, yet agree very very closely with it in all other respects, we would have considered ourselves justified in proposing a new genus for its special benefit. As it is, we are not at all satisfied that it would not be better to set these three species apart as a distinct genus, thereby facilitating references to a genetic relationship that before the discovery of these shells was not even suspected. That a relationship of this kind does exist between *Trochonema* and the *Pleurotomaridæ* is now scarcely to be denied, for it seems almost inconceivable that such intimate agreement in structure could occur except in near branches of the same stock." (Ulrich, 1897, p. 991).

The discovery of a new species at Pointe Claire, Quebec, strengthens the idea that *Lophospira* (?) *knoxvillensis*, *L.* (?) *trochonemoides* and *L.* (?) *notabilis*, should be withdrawn from *Lophospira* and placed in a separate genus. Additional reasons to those expressed by Dr. Ulrich are: (1) that the discovery of a shell undoubtedly belonging to the *trochonemoides* group, so far from the original localities in Tennessee and Kentucky, indicates that this group represents a definite development and not merely a local variation, and (2) that the group is a good index for the Black River beds over a very wide area. Unfortunately the available specimens of the new species do not permit a study of the umbilicus and the aperture, but the general appearance, the flat shoulder above the upper carina, the marked slit-band, the almost vertical peripheral portion between the suture and the slit-band, all set this shell suf-

ficiently apart from the known species of *Lophospira* to warrant creating a new genus.

The genus is intermediate between *Lophospira* and *Trochonema* and serves as a link between the *Pleurotomaridæ* d'Orbigny and the *Trochonematidæ*. *Trochonemella* is included with the *Pleurotomaridæ* because the original *trochonemoides* group of Ulrich was included by him in that family.

Species which belong to this genus are:—*Lophospira* (?) *knoxvillensis* Ulrich, *L.* (?) *trochonemoides* Ulrich, *L.* (?) *notabilis* Ulrich, and *Trochonemella montrealensis* Okulitch. The genotype is *Lophospira* (?) *notabilis* Ulrich.

Trochonemella montrealensis n. sp.

Plate 2, fig. 2.

Height and width are nearly equal, each in the largest specimen measuring about 19 mm., in a smaller one 12 mm. Apical angle about 82°; there are four volutions. Upper carina, which is situated midway between the suture and the slit-band, is very strong and prominent, ornamented by ribs produced by raised growth lines; lower peripheral carina faint or absent and not ornamented. Midway between these carinæ and separated from them by narrow concave areas is the broad salient slit-band, crossed by convex imbricating lamellæ, averaging, on the body whorl, about 14 in 10 mm. In section the top of the whorls (that is, the space between the suture and upper carina) is flat. The aperture and umbilicus have not been seen, but presumably are similar to those of *Trochonemella notabilis*.

The shell is in general very similar to *T. notabilis* (Ulrich) from which it differs in being considerably smaller; in having a smaller apical angle (*T. notabilis* has an apical angle of 87°); in the less prominent lower carina, and in the finer ornamentation of the slit-band, there being 14 lamellæ instead of 7 per cm.

Horizon and locality: Lowville at Pointe Claire, Quebec.

CEPHALOPODA.

All the cephalopods found appear to belong to species previously reported from Ontario and localities further south, indicating a great uniformity of the cephalopodan fauna over a large area. A particularly noteworthy resemblance was found to exist between the Montreal fossils and the ones from Paquette Rapids, Que., on the Ottawa River, almost all the species in our collection having been previously listed from that locality.

TRILOBITA.

In the collection of fossils from the local Black River formations trilobites are not very numerous, and, with a few exceptions, are in a bad state of preservation.

Bathyurus extans is the most common trilobite and numerous pygidia of this species can be found at Pointe Claire. Almost all the species mentioned by Dr. Wilson from the Black River in the vicinity of Ottawa are present in our collection. The list from Kingston, Ontario, exceeds ours by three species. There is, therefore, a close similarity between the trilobite faunas of the three localities. *Bathyurus extans* is entirely limited to the Lowville, while *Cer-aurus pleurexanthemus*, *Encrinurus vigilans*, and *Isotelus gigas?* occur both in the Lowville and Leray, and extend into Trenton.

The Trenton affinities of the local Black River trilobite fauna are apparent, but the fact that some abundant species such as *Bathyurus extans* are entirely confined to the Black River is another reason for considering the Black River to be an independent group.

Illænus martineauensis n. sp.

Plate 2, fig. 5.

The species is known from a slightly imperfect cranium and free cheeks. Cephalon strongly convex and smooth. Dorsal furrows wide and shallow, diverging anteriorly but not quite reaching the anterior margin. Glabella subtriangular, not marked off from the anterior of the cephalon, and tapering toward the bluntly rounded posterior portion. Free cheeks narrow with no genal spines. The facial sutures, behind the eye, diverge somewhat; in front of the eye, they are probably nearly parallel. Eyes small, distant from the glabella, located about one-third of the way in front of the posterior margin of the cephalon.

This species closely resembles *Illænus americanus* Billings, from which it differs in its diverging dorsal furrows and lack of genal lapets.

Horizon and locality: Middle Leray at Martineau quarry, Mile End, Montreal, Que.

Pterygometopus harrisi n. sp.

Plate 2, fig. 6.

The species is known only from an imperfect

cranium, which is sufficiently distinctive to afford an easy separation from other species of *Pterygometopus*.

Glabella is moderately convex; the anterior part transversely elliptical, covered with small tubercles. The first pair of glabellar furrows are deep, wide at the dorsal furrow, but do not meet each other. From the dorsal furrow they proceed slightly backward. The second pair are short, indistinct, do not reach the dorsal furrows, and are inclined from it anteriorly. The third pair are deep, their outer halves strictly transverse, the inner halves deflected anteriorly. The neck furrow is incomplete.

Only a fragment of the fixed cheek is preserved; this contains the palpebral lobe, which is situated just behind the middle of the glabella, extending from opposite the first to opposite the third furrow. In outline this lobe is irregularly lunate, and its anterior part approaches, but does not quite reach, the dorsal furrow near the first glabellar furrow. The nuchal segment is imperfectly preserved, but there is enough of it to indicate that it was very strongly raised. Measurements — glabella 5 mm. long, and 5 mm. wide at the widest (anterior) part.

This species differs from *Pterygometopus annulatus* Raymond (Chazy of Valcour Is.) by having a more nearly elliptical anterior part of the glabella, the tubercles seem to be finer, and the second pair of glabellar furrows do not reach the dorsal furrow. The first and third glabellar furrows are deeper than in *P. annulatus*. In *P. callicephalus* (Hall) the tubercles are coarser and the second glabellar furrows do reach the dorsal furrow.

Horizon and locality: Lowville of Pointe Claire, Quebec.

Specific name in honour of Mr. J. J. Harris, M.Sc., whose work on the detail of the stratigraphy of the local Black River was a great help to the author.

LIST OF BLACK RIVER FOSSILS.

ABBREVIATIONS USED:

L—Logan and Billings.
A—Ami and Ells.

R—Raymond.
O—Okulitch.

Name	Listed by	Distribution of fossils collected by Okulitch					
		Lowville			Leray		
		L	M	U	L	M	U
CLASS ANTHOZOA.							
<i>Streptelasma corniculum</i> Hall	A O			x	x	x	
<i>S. profundum</i> (Conrad)	L O			x	x	x	
<i>Columnaria alveolata</i> Goldfuss	L O			x		x	

Name	Listed by	Distribution of fossils collected by Okulitch					
		Lowville			Leray		
		L	M	U	L	M	U
<i>C. halli</i> Nicholson	ARO			x	x	x	x
<i>Fletcheria incerta</i> (Billings)	L						
<i>Tetradium cellulosum</i> (Hall)	RO	x	x	x			
<i>T. clarki</i> Okulitch	O		x				
<i>T. cylindricum</i> ? Wilson	O		x				
<i>T. fibratum</i> Safford	LARO		x	x			
<i>T. minus</i> Safford	O				x		
<i>T. racemosum</i> Raymond	O		x	x			
CLASS HYDROZOA.							
<i>Stromatocerium canadense</i> N. & M.	O					x	
<i>S. canadense</i> cf. var. <i>minimum</i> Parks	O	x					
<i>S. rugosum</i> Hall	AO	x	x	x		x	
"Worms?"							
<i>Phytopsis tubulosum</i> Hall	LARO	x	x	x			
CLASS BRYOZOA.							
	O	x	x	x	x	x	x
<i>Stenopora fibrosa</i> Billings	L						
<i>Pachydictya acuta</i> Hall	A						
CLASS BRACHIOPODA.							
<i>Lingula</i> sp. ind.	O	(Pamelia)					
<i>Trematis montrealensis</i> Billings	A						
<i>Hebertella</i> sp. ind.	O					x	
<i>Hesperorthis</i> cf. <i>tricenaria</i> (Conrad)	O						x
<i>Hesperorthis</i> sp. ind.	O				x		
<i>Dinorthis</i> sp. ind.	O					x	
<i>Pionodema sinuata</i> Okulitch	O				x	x	
<i>P. subaquata gibbosa</i> (Billings)	RO					x	
<i>Leptaena radialis</i> Okulitch	O				x		
<i>Rafinesquina alternata</i> (Emmons)	L O			x	x	x	
<i>R. clara</i> Okulitch	O				x	x	
<i>R. transitionis</i> Okulitch	O			x	x		
<i>R. grandis</i> Okulitch	O	x				x	
<i>R. minnesotensis</i> (Winchell)	O		x	x	x	x	
<i>R. wagneri</i> Okulitch	O				x	x	
<i>R. williamsi</i> Okulitch	O				x		
<i>Strophomena corrugata</i> Okulitch	O				x		
<i>S. emaciata</i> Winchell & Schuchert	O				x	x	
<i>S. incurvata</i> (Shepard)	ARO			x	x	x	
<i>S. irregularis</i> Wilson	O					x	
<i>Rhynchotrema increbescens</i> (Hall)	O			x	x	x	x
<i>Zygospira recurvirostris</i> (Hall)	L O		x	x	x	x	
CLASS PELECYPODA.							
<i>Ctenodonta abrupta</i> (?) Billings	O					x	
<i>C. contracta</i> Salter	L						
<i>C. nasuta</i> (Hall)	L						
<i>Cyrtodonta huronensis</i> Billings	LA O			x			
<i>Cyrtodonta subcarinata</i> Billings	A O		x	x			
CLASS GASTROPODA.							
<i>Phragmolites triangularia</i> Ulrich & Scofield	O				x	x	
<i>Hormotoma gracilis</i> (Hall)	LA O		x	x	x	x	
<i>H. wilsoni</i> Okulitch	O					x	
<i>H. subangulata</i> Ulrich & Scofield	O					x	
<i>Liospira larvata</i> (Salter)	A O					x	
<i>L. cf. micula</i> (Hall)	O					x	
<i>L. peneplana</i> Okulitch	O					x	
<i>L. cf. vitruvia</i> (Billings)	O			x		x	
<i>Lophospira bicincta</i> (Hall)	O			x	x	x	
<i>L. cf. oweni</i> Ulrich & Scofield	O					x	
<i>L. perangulata</i> (Hall)	LA O			x		x	
<i>L. ventricosa</i> (Hall)	L						
<i>Trochonemella montrealensis</i> Okulitch	O		x	x			

Name	Listed by	Distribution of fossils collected by Okulitch					
		Lowville			Leray		
		L	M	U	L	M	U
<i>Helicotoma planulata</i> Salter	LA						
<i>Maclurites logani</i> (Salter) .. .	L RO					x	
<i>Raphistoma aperta</i> Salter .. .	L						
<i>R. rotuloides</i> (Hall) .. .	L						
<i>Raphistomina lapicida</i> (Salter) .. .	L						
<i>Holopea similis</i> Ulrich & Scofield .. .	O			x			
<i>Trochonema umbilicata</i> (Hall) .. .	L O			x			
CLASS CEPHALOPODA.							
<i>Cameroceras? multicaucratum</i> (Emmons) ..	LARO		x	x			
<i>Endoceras</i> sp. .. .	R						
<i>Orthoceras recticaucratum</i> Hall .. .	R						
<i>Cycloceras decrescens</i> (Billings) .. .	O	x	x	x	x	x	x
<i>Spyroceras</i> cf. <i>paquetense</i> Fœrste .. .	O					x	
<i>S. cylindratum</i> Fœrste .. .	O			x	x	x	
<i>Zitteloceras</i> sp. .. .	O				x		
<i>Sactoceras josephianum</i> Fœrste .. .	O			x	x	x	
<i>S. pictolineatum</i> Fœrste .. .	O			x			
<i>Actinoceras bigsbyi</i> Bronn .. .	LA						
<i>A. billingsi</i> Fœrste .. .	O			x	x	x	
<i>A. sp. ind.</i> .. .	R						
<i>Gonioceras anceps</i> Hall .. .	A O				x		
<i>Ormoceras</i> sp. ind. .. .	O			x	x		
<i>Richardsonoceras</i> (?) sp. ind. .. .	O					x	
<i>Cyrtoceras</i> sp. ind. .. .	LA						
CLASS CRUSTACEA.							
Subclass Trilobita .. .							
<i>Bathyrus extans</i> (Hall) .. .	ARO	x		x			
<i>B. sp. ind.</i> .. .	O			x			
<i>Isotelus gigas</i> De Kay .. .	RO		x	x	x	x	
<i>Bumastus bellewensis</i> Raymond & Narraway	O				x		
<i>B. milleri</i> (Billings) .. .	R						
<i>Illæus martineauensis</i> Okulitch .. .	O					x	
<i>Encrinurus vigilans</i> (Hall) .. .	LA O			x		x	
<i>Ceraurus pleurexanthemus</i> Green .. .	O			x	x		
<i>Pteryometopus harrisi</i> Okulitch .. .	O			x			
CLASS EUCRSTACEA.							
<i>Leperditia canadense</i> Jones .. .	L						
<i>Primitia logani leperditoides</i> (Jones) .. .	A						
PLANTÆ.							
Fuccoids .. .							
<i>Licrophycus</i> cf. <i>L. ottawacense</i> Billings ..	A						
<i>Solenopora compacta</i> Billings .. .	L						

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PLATE I

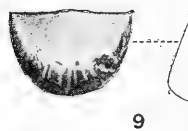
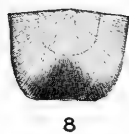
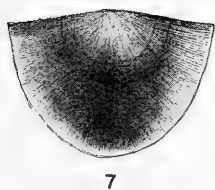
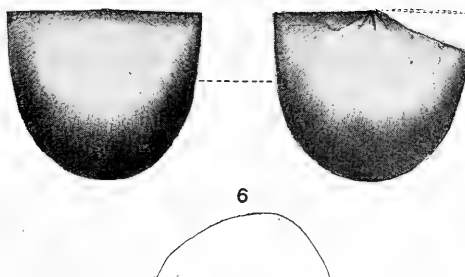
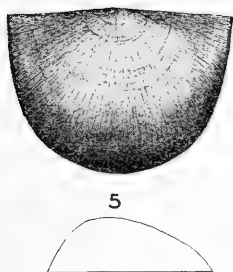
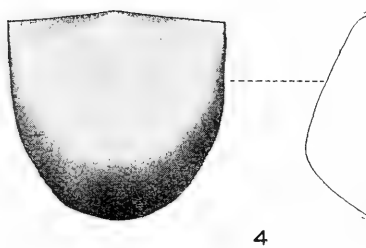
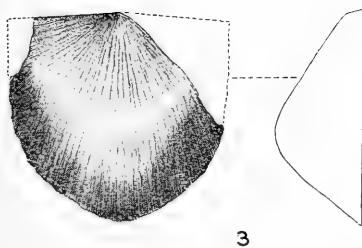
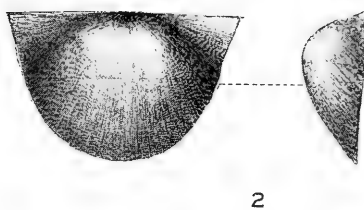
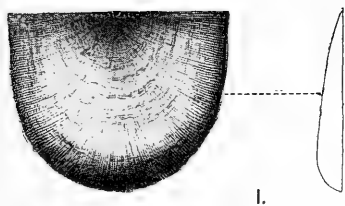
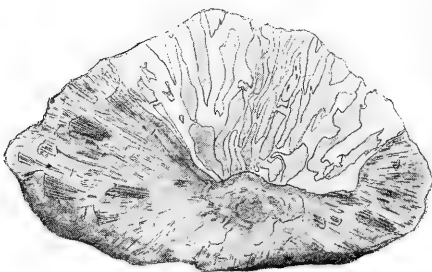


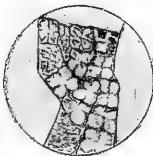
PLATE 2



1A



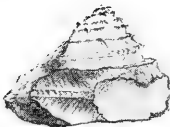
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1C



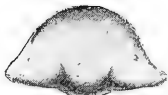
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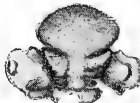
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4



5



6

EXPLANATION OF PLATES.

PLATE 1. Page 105

- Fig. 1. *Rafinesquina clara* n. sp. x 1-1/3.
 Fig. 2. *Rafinesquina grandis* n. sp. x 2/3.
 Fig. 3. *Rafinesquina transitionalis* n. sp. natural size, pedicle valve of an adult individual.
 Fig. 4. *Rafinesquina transitionalis* n. sp. x 1-1/3, pedicle valve of a young individual showing the geniculation to be considerably closer to the anterior margin than in an adult.
 Fig. 5. *Rafinesquina wagneri* n. sp. x 1-1/3.
 Fig. 6. *Rafinesquina williamsi* n. sp. natural size.
 a) pedicle valve.
 b) pedicle valve showing muscle scars.
 Fig. 7. *Strophomena corrugata* n. sp. natural size, showing prominent wrinkles on the pedicle valve.

Fig. 8. *Pionodema sinuata* n. sp. x 1-1/3.Fig. 9. *Leptæna radialis* n. sp. x 1-2/3.

PLATE 2. Page 106.

- Figs. 1a, 1b, 1c *Tetradium clarki* n. sp.
 1a. appearance of a corallum with a polished longitudinal section. x 1/3.
 1b. transverse section showing "laminæ" and corallites. x 1/3.
 1c. showing portion of laminæ; some corallites show double wall. x 8.
 Fig. 2. *Trochonebella montrealensis* sp. et gen. nov., side view shows the coarsely marked slit-band. x 1-1/3.
 Fig. 3. *Liospira peneplana* n. sp. x 1-1/3.
 Fig. 4. *Hormotoma wilsoni* n. sp. x 1-1/3.
 Fig. 5. *Illænus martineaucensis* n. sp. x 2.
 Fig. 6. *Pterygometopus harrisi* n. sp. x 2.

SOME FUNGI FROM ANTICOSTI ISLAND AND GASPE PENINSULA*

By J. ADAMS



THE FUNGI mentioned below were collected during a short visit to Anticosti in August, 1933, and to Anticosti and Gaspé Peninsula during the latter part of August and the beginning of September, 1934. No particular attention was given to the study of this group of plants as I was interested mainly in the ferns and seed-plants.

In Schmitt's *Monographie de l'île d'Anticosti*, 1904, only eleven species of fungi and several genera incompletely named are mentioned. The names given below are all additions to the flora of the island. Numerous saprophytic forms were seen in the woods but as these are difficult to preserve they can be identified satisfactorily only by a specialist on the spot.

My thanks are due to Mr. I. L. Connors who named most of the parasitic species, and to Miss I. Mounce who undertook the identification of the saprophytes.

MYXOMYCETES

Lycogala sp. On dead wood. Ellis Bay, Anticosti.

PHYCOMYCETES

- Cystopus candidus* Lév. On *Capsella Bursa-pastoris*. Port Menier, Anticosti; Cap des Rosiers, Gaspé Peninsula.
Cystopus cubicus Lév. On *Senecio aureus*. In wood along logging railway, Anticosti.
Peronospora parasitica (Pers.) de Bary. On *Capsella Bursa-pastoris*. Port Menier, Anticosti.

ASCOMYCETES

- Claviceps purpurea* (Fr.) Tul. On *Poa eminens* and *Secale cereale*. Port Menier, Anticosti.
Helvella sp. On cleared ground along the logging railway. Anticosti.
Mycosphærella Cerastii (Pers.) Schroet. On *Stellaria borealis*. Ellis Bay, Anticosti.
Plowrightia morbosa (Schw.) Sacc. On *Prunus* sp. Gaspé.
Rhytisma Andromedæ (Pers.) Fr. On *Andromeda Polifolia*. In swamp along the logging railway. Anticosti.
R. salicinum (Pers.) Fr. On *Salix candida*. Port Menier. Anticosti.
Sphærotheca Humuli (DC) Bur. var. *fuliginea* (Schl.) Salmon. On *Prenanthes altissima*. Ellis Bay, Anticosti.

* Contribution No. 423 from the Division of Botany, Experimental Farms Branch, Department of Agriculture, Ottawa, Canada.

USTILAGINEAE

Cintractia Caricis (Pers.) Magn. On *Carex* sp.
Ellis Bay. Anticosti.

UREDINEAE

Accidium sp. On *Conioselinum canadense*
Swamp along logging railway. Anticosti.

Chrysomyxa ledicola (Pk.) Lagerh. On *Picca canadensis*. Ellis Bay. Anticosti.

Coleosporium Solidaginis Thuem. On *Aster* sp.
and *Solidago* sp. Gaspé.

Cronartium ribicola Fisch. On *Ribes* sp. Percé.
Melampsorella elatina Arth. On *Abies balsamea*
causing witches' brooms. Common in western end of Anticosti Island.

Phragmidium americanum (Peck) Diet. On
Rosa blanda. Ellis Bay, Anticosti.

Phragmidium Potentillae (Pers.) Karst. On
Potentilla pectinata. Percé.

Puccinia Arenariae (Schum.) Wirt. On *Arenaria lateriflora*. Ellis Bay, Anticosti.

P. atropuncta Pk. et Cke. On *Zygadenus chloranthus*. Baie Ste. Claire. Anticosti.

P. Bistortae (Str.) DC. On *Polygonum viviparum*.
Ellis Bay. Anticosti.

P. Clematidis (DC) Lagerh. On *Thalictrum alpinum*. Swamp along logging railway. Anticosti.

P. Heucherae (Schw.) Dict. On *Mitella nuda*.
Ellis Bay, Anticosti.

Puccinia Hieracii (Schum.) Mart. On *Hieracium* sp. Ellis Bay, Anticosti, and Gaspé.

P. Iridis (DC) Wallr. On *Iris versicolor*. Ellis Bay, Anticosti.

P. karelica Tranz. On *Carex paupercula*. Ellis Bay, Anticosti.

P. recedens Syd. On *Senecio aureus*. Ellis Bay. Anticosti.

P. suaveolens (Pers.) Rostr. On *Cirsium arvense*. Ellis Bay, Anticosti.

P. Viola (Schum.) DC. On *Viola* sp. Ellis Bay, Anticosti.

Pucciniastrum americanum (Farl.) Arth. On
Rubus strigosus. Ellis Bay, Anticosti.

BASIDIOMYCETES

Dacryomyces palmatus (Schw.) Bres. On dead bark. Ellis Bay. Anticosti.

Fomes pinicola (Sw.) Cooke On dead wood. Along logging railway. Anticosti.

Lenzites saepiaria (Wulf.) Fr. On dead wood. Ellis Bay, Anticosti

Panus stypticus Fr. On dead wood. Ellis Bay. Anticosti.

Polyporus abietinus (Dicks.) Fr. On dead wood. Ellis Bay, Anticosti.

P. cinnabarinus (Jacob.) Fr. On dead wood. Ellis Bay, Anticosti.

EPILOBIUM LATIFOLIUM L. nov. subsp. *LEUCANTHUM* (vulgo "White Alpine Willowherb")

A Tito Ulke descriptum

Hæc subspecies similis est *Epilobio latifolio* L. sed planta tota robustior, petalis dimidio fere latioribus et albis non purpureis; foliis duplo fere latioribus; caule perenni, firmo, alto 15-35 cm., terete, glauco, rubente et piloso supra, ramoso et ad radicem lignoso; ramis axillaribus folia minora et opposita ferentibus; foliis ovato-lanceolatis, integris aut densiculatis, 3-6cm. longis, 1-2 cm. latis, basibus et apicibus acutis, pilis subtilibus indutis, in caule alternantibus, oppositis in ramis, coriaceis, glaucis, subsessilibus, venis lateralibus haud visibilibus plerumque liberis; floribus positus in terminalibus racemis brevibus, foliosis, plerumque confertis; petalis 4, integris, obovatis, long. 2 cm., lat. 1.5 cm., albis, purpura minuta venatis, lobis calicis angustis, lanceolatis aut oblongis, long. 13-15 mm.; staminibus 8, long. 11-12 mm., antheris purpureis, imis filamentis dilatatis; pistillo 1, long. 7 mm., purpureo, in-

clinato, stilo glabro; stigmatibus 4, divaricatis, oblongis, long. 3-4 mm.; capsula fusiformi linearis, canescenti, long. 2-5cm., lat. 3-4 mm., pluriseminata; seminibus long. 2 mm., fusiformibus, sine rostris, comosis albicantibus elongatis.

Plants usually in dense clumps, 3 or 4 m. in diameter, associated with *Epilobium latifolium* on gravelly flats forming islands near the head of Horsethief Creek at about 2300 m. elevation, just below the moraine of Starbird Glacier, Kootenay District, British Columbia. A dozen plants were obtained.

The type specimen, No. 1267, of *E. L. leucanthum* is in the herbarium of the Catholic University at Brookland, D.C., and cotypes are in the University of Toronto and Harvard University collections.

NOTES AND OBSERVATIONS

WOOD TURTLE FROM ONTARIO.—About May 1st, 1933, I received from Mr. Elwood Campbell of Clinton, Huron County, two specimens of the wood turtle (*Clemmys insculpta* (Le Conte)) which he had collected in the vicinity of Clinton. One of these was given to the Royal Ontario Museum of Zoology and the other retained at the Ontario Agricultural College. The publication of this brief note appears to be warranted by the scantiness of previously published information on the occurrence of this turtle in Ontario.—W. E. HEMING, *Ontario Agricultural College, Guelph, Ontario.*

ANOTHER WOOD TURTLE RECORD FROM ONTARIO.—During the summer of 1934 I followed up the discovery of the wood turtle near Clinton, Ontario, by visiting the vicinity where the specimens reported by Mr. Heming had been found. On July 26, 1934, in company with Mr. Elwood Campbell, and my nephew D'Arcy LeRay, I visited the farm of Mr. Fred Hopkins, Holmesville, near Clinton, Huron County. During the evening of that day, Mr. Campbell found two specimens under the roots of scrub willows near a small stream. The next morning D'Arcy LeRay and I each found one. In both cases, the individual was sunning itself on a mass of debris at the side of the stream.—W. J. LERAY, *Department of Biology, University of Toronto.*

THE OPOSSUM IN KENT COUNTY, ONTARIO.—A fine female opossum (*Didelphis virginiana*) was trapped on or about December 15th, 1934, on the farm of Mr. Hiram McLarty, township of Howard, Kent County, Ontario. It was caught in a burrow under a stump. This is the second specimen from this locality. The previous one

was taken by Mr. Bert E. Shanks, lot 16, concession 6, township of Harwich, Kent Co., about the middle of February, 1892. It was found under a partly uprooted tree by Mr. Shank's hound which worked all day trying to dislodge it. In the evening Mr. Shanks assisted the hound and they succeeded in capturing it. The opossum is believed to have been in hibernation. The snow was quite deep at the time and as Mr. Shanks was cutting logs, he passed the place where the opossum was found every day and no tracks had been seen at any time. This latter specimen is now in the Royal Ontario Museum of Zoology.—J. H. SMITH, *Blenheim, Ontario.*

ANOTHER LEAST WEASEL SPECIMEN FROM ONTARIO.—During the summer of 1931, a flat "unmade" skin of the least weasel, (the form *Mustela rixosa rixosa*, assumed on geographic grounds) was presented to the field party of the Royal Ontario Museum of Zoology by Mr. Arthur Caron of Sault Ste. Marie, Ontario. Mr. Caron informed the writer that this weasel was taken along the railway track at Tatnall, near Oba, Ontario, in late summer, 1929, by his brother. It is in the brown pelage.

This is the second inland Ontario specimen, the other, taken at Heaslip, Temiskaming District, has been recorded by Saunders, (*Trans. Royal Can. Inst.*, July, 1932). The earlier records are of specimens in the United States National Museum taken at "Fort Albany" and "Moose Factory" and were recorded by Bangs (*Proc. Biol. Soc. of Wash.*, Feb., 1896).

Seton, in his *Life Histories of Northern Animals* (p. 861) marks a record on his map of distribution which falls on the Minnesota-Ontario boundary line. The text, however, does not supplement this record with a specific locality statement.—L. L. SNYDER.

BOOK REVIEWS

AMERICAN BIRD BIOGRAPHIES; containing the complete life-histories of familiar birds written in autobiographical form by Dr. Arthur A. Allan, Professor of Ornithology in Cornell University, etc. With ten colour plates and ten wash-drawings by George Miksch Sutton and 190 photographs of birds in nature by the author. Comstock Publishing Company, Ithaca, New York, 1934. pp. 238, large 8vo. Price \$3.50 in the U.S.

Anything on birds from the pen of Dr. Allen is worth while and this volume demonstrates the rule. In the mass of popular nature literature put before (often foisted upon) the amateur public one can rely on his work being not only delightfully presented to the casual reader but as accurate in its substance as a heavily scientific treatise. The volume consists of a number of life histories of familiar and interesting birds that have previously been run

serially in *Bird-Lore*. The viewpoint of the bird is given sympathetically and directly without undue sentimentality or anthropomorphism. The author and publisher have performed a benefit to the nature student in bringing them together in this convenient and admirable form. Dr. Allen is an expert with the camera and the numerous half-tone reproductions of his photographic work give many charming and intimate views of the birds at home in nature.

The plates in both wash and colour by Dr. Sutton corroborate our growing impression that he is a bird artist to be reckoned with and is taking his place among the masters of that branch of art that America has so notably produced of late. This series is in some respects the best work that he has had published and shows the development of an attractive individuality. His birds are well detailed with good knowledge without being fussy, and show control of medium. They are particularly well modeled and distinctly three dimensioned. The backgrounds are broadly treated without distracting detail but richly coloured and throw out the birds in harmonious contrast and very pleasing colour scheme. A feature that adds greatly to the general effect of the plates is the soft gray matting that surrounds them.

The volume is well bound in brown linen; the paper and printing are excellent. It is a book that is desirable in every bird-lover's

library and is particularly appropriate to gift seasons. — P. A. T.

SONGS OF WILD BIRDS. By Albert R. Brand, Associate in Ornithology, American Museum of Natural History. Thomas Nelson and Sons, New York. 1934. 8¾ x 7½. 91 pp. and two phonograph records. \$2.00.

Students of ornithology, both professional and amateur, have long recognized both the importance and the difficulty of learning how to identify an unseen bird by its song or call. The appearance of this book should do much to shorten the years necessary to acquire proficiency in this fascinating but often disheartening pursuit. A day or so ago, I played the records over for the benefit of the most severe critic available. — the family cat, whose interest was keen and immediate. He seemed to think the various thrushes most realistic, but was less taken with the cry of the Whip-poor-Will, though I thought it one of the best. Mr. Brand's success in recording these songs by means of specially contrived microphones and other elaborate and expensive equipment must be as great a satisfaction to him as it is to his many friends who have watched his progress with interest. The future volumes which we are promised will be awaited with keen anticipation. — D. L.

AMERICAN ORNITHOLOGISTS' UNION MEETING IN TORONTO

At the invitation of the Royal Ontario Museum, the American Ornithologists' Union will hold its next annual meeting in Toronto from October 21 to 25, inclusive. Headquarters will be in the Royal York, a splendid hotel where rates of \$3.00 per day for single rooms and \$5.00 per day for double rooms, European plan, have been arranged.

Public sessions for the reading of papers commence on Tuesday, October 22. This is the most important feature of A.O.U. meetings. Ornithologists from all over North America will be present and matters pertaining to birds will be discussed by the most eminent authorities of the continent. Canadian bird-students should plan now to attend the Toronto meeting and take advantage of the opportunity to hear and make the acquaintance of the ornithologists of Canada and the United States. Topics of popular as well as technical interest will appear on the programme.

On Friday, October 24, the meeting will conclude with a field day at Hamilton, the former home of Thomas McIlwraith, a founder of the A.O.U. The Dundas Sanctuary will be inspected and an opportunity to see the congregation of wild fowl on Burlington Bay will be afforded.

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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THE RED-BACKED SANDPIPER AT TORONTO

By STUART L. THOMPSON



THE CHRISTMAS CENSUS of the Toronto Field Naturalists' Club in 1934 brought to light at least one remarkable record. To Robert Lindsay, the leader of the lake shore group, goes the credit of reporting the occurrence of a Red-backed Sandpiper [*Pelidna alpina*.] Had this been on some former census when Toronto had little or no snow and sandy beaches were in evidence all winter, one would scarcely be surprised at a sandpiper out of season. The habitat in such a winter would have been unchanged. But to

find a bird of the sand running around in the midst of ice and snow was at least a unique sight.

The Sandpiper was found wading in a mere thread of running water which drains Grenadier Pond into Lake Ontario at Sunnyside. All else about was frozen solid. As might be expected with such a limited feeding ground the bird was loath to leave and permitted a very close approach. It was examined at leisure at a distance of ten feet, was in fine fall plumage, very active, apparently in good health and uninjured.

The following day, December 31st, I went down early in the morning and found it still there in its stream, wading up and down searching the bottom for food, quite unconcerned at my close approach. As its hunting ground was limited it soon arrived at the end of the open stream. It was laughable to see the bird slipping and skidding on the smooth ice over which it made a short cut back to its starting point in the strong wind that was blowing.

At noon I secured the services of a photographer with a "Graflex" and drove down again. The bird was still there and we snapped it several times as it waded and fed in the stream. In the deeper water it did not hesitate to swim.

The question came to mind of how and where the bird passed the night. Certainly there was no shelter here — a stream of running water amid the ice and snow of a frozen beach. So

at 5 p.m. I made a third trip to observe. In the fading light I found the bird still wading and feeding. For half an hour I watched it till in the gloom it was difficult to see anything but a whitish breast. At this time it had ceased feeding and was preening itself. All at once it whistled a clear shrill distinctly "limicoline" note, several times, then sprang into the air and circled around whistling. Though lost to sight in the gloom of the evening I could hear its note growing fainter and fainter in the northern sky. Finally I could hear no more.

Where the bird spent the night it is impossible to say. To the north is nothing but frozen Grenadier Pond, wooded hillsides and city, nothing a sandpiper would seek. Of course it is possible that after a wide circle in flight the bird flew southward over Lake Ontario. In any case it flew well enough to have left the unfrozen stream days ago had it chosen to do so.

WILLIAM COUPER'S OBSERVATIONS OF BIRDS OF THE LABRADOR PENINSULA

By HARRISON F. LEWIS



IN THE YEAR 1867, William Couper, who is well known as a Canadian naturalist prominent in the second half of the nineteenth century, made a visit, extending from May 28 to July 30, to the southern coast of the Labrador Peninsula, which is the north shore of the Gulf of St. Lawrence, "for the purpose of identifying, collecting and studying the eggs of birds found breeding on the coast, and, as far as could be ascertained, in the interior of the country".

Ornithological information obtained by Couper on the fringe of the Labrador Peninsula during this journey was published by him from time to time. I have been able to find various items of it in three different publications of his. Dr. Glover M. Allen and the late Dr. Charles W. Townsend, in their important paper, *Birds of Labrador*, in which they endeavored to summarize ornithological work in the Labrador Peninsula and resulting knowledge up to 1906, make no reference to Couper's visit to that region. In their summary of the pertinent literature they include only one of his published papers, namely, *Bird Nesting in Labrador*, which

they attribute erroneously, as James L. Baillie, Jr., has pointed out, in his interesting and informative paper² on Couper's life and work, to the late Napoleon A. Comeau. In this they probably followed W. A. Stearns³, who made the same mistake. In their annotated list of birds found in Labrador, Townsend and Allen do not quote any information from this paper or make any direct reference to it. They do refer⁴ to a record, probably erroneous, of the nesting of the King Eider, which was first published in this paper, but they give as their authority neither Couper nor Comeau, but W. A. Stearns, who had published a quotation of the record. It seems probable that Townsend and Allen never saw the original publication of *Bird Nesting in Labrador*, but included it in their summary of literature wholly on the authority of Stearns. It therefore seems desirable at this time to call attention anew to Couper's work in this field and to comment briefly, in the light of our present knowledge, on those of his records that have any special interest.

² *The Canadian Field-Naturalist*, 43:169-176.

³ *Proc. U.S. Nat. Mus.*, vol. VI, no. 8, page 121. (for 1883), Washington, 1884.

⁴ *op. cit.*, page 336.

¹ *Proc. Bost. Soc. Nat. Hist.*, 33:277-428.

Those relating to four species, namely, the King Eider, the Red-tailed Hawk, the Blackburnian Warbler, and the Redstart, have been briefly discussed by Baillie.⁵

Unfortunately, the ornithological observations made by Couper during the above-mentioned journey were not published anywhere in the form of a systematic, annotated list of the birds observed. His three publications on the subject which I have been able to discover consist of two papers and one short series of published notes and queries. They are as follows:

"Investigations of a Naturalist between Mingan and Watchicouti, Labrador. By Wm. Couper, Vice-President, Quebec Branch, Entomological Society of Canada; Cor. Mem. Ent. Soc. of Philadelphia, and Nat. Hist. Soc. of Montreal. Quebec: printed at the 'Morning Chronicle' office, 1868." This is a paper-covered pamphlet of 14 pages. It includes notes on birds, insects; fish, mammals, topography, human inhabitants, administration, fisheries, and fur trade in the region mentioned in its title. The Public Archives of Canada and the Library of the Geological Survey of Canada, both at Ottawa, each contain a copy of it.⁶ As the author mentions that he received some financial support for his investigations from the late E. A. Samuels, of Boston, Massachusetts, it is not unlikely that copies of this pamphlet exist in New England also. Records appearing in this publication are distinguished in this present summary by being marked with "A".

Bird Nesting in Labrador, published in *The Canadian Sportsman and Naturalist*, vol. I, no. 7, pages 50-52, Montreal, July 15th, 1881. Couper was owner and editor of the periodical in which this paper appeared. The paper itself is a rambling narrative, overlapping its predecessor to a large extent, but omitting mention of 7 species recorded in the earlier publication and including 14 species which were not named in that pamphlet. It concludes with the statement that "We will give a list of the Western forms of birds occurring on the Labrador coast, in our next number", but neither in the next number of the magazine nor elsewhere have I been able to find such a list. This paper is not accompanied by an author's name, presumably because Couper regarded it as editorial matter. This lack of an author's name opened the way for

the error of W. A. Stearns and others in attributing the paper to Napoleon A. Comeau. That the paper was written by Couper is indicated by internal evidence, such as the correspondence of much of its information and even of the wording of some passages with like features of Couper's paper of 1868 and the statement, in the introductory remarks, that "In 1867, such was the object of the Editor of this journal, who went there to collect a series of bird eggs, and determine the species breeding on the coast".

The authorship of the paper is made entirely clear, however, in a later number of the same periodical⁷, where, after the publication of the erroneous attribution by Stearns of one of the records from the paper to Mr. Napoleon A. Comeau, we find the definite correcting statement that "*Bird-nesting in Labrador* was written by Mr. William Couper, the Editor of this Journal".

Records appearing in this second paper are distinguished in this present summary by being marked with "B".

"Ornithological Queries", a continued series of editorial requests for new information about various matters relating to Canadian ornithology, was published in *The Canadian Sportsman and Naturalist*, and contains, in the instalments that appear, respectively, in vol. II, no. 5, page 136. Montreal, May, 1882, and in vol. II, no. 6, pages 141-142, Montreal, June, 1882, scattered statements about Couper's experiences with several species of birds in the Labrador Peninsula. Records appearing under this title are distinguished in this present summary by being marked with "C".

The ornithological records contained in these three papers are united, re-arranged in modern order, and summarized in the annotated list that follows. The bird names used by Couper are here repeated without change, as all of them are identifiable without difficulty.

B LEACH'S PETREL. *Thalassidroma Leachii*—To be seen skimming over the stormy sea between Seven Islands and Mingan, "but where the birds nest is only conjecture".

A CANADA GOOSE.—Frequenting islands, not easily reached except by swimming, in woodland lakes near lower part of Little Watshishu River, and thought to be nesting there.

AB EIDER DUCK. *Somateria mollissima*.—Nesting in abundance.

⁵ loc. cit.

⁶ James L. Baillie, Jr., informs me that he possesses an autographed copy of this pamphlet and that the library of McGill University, Montreal, and the library of Laval University, Quebec, each possess a copy of it.

⁷ *The Canadian Sportsman and Naturalist*, vol. III, no. 10, p. 275, Montreal, October, 1883.

B KING EIDER. *S. spectabilis*. — It is stated that the nest of this species was found on a small island between Esquimaux Point and Watshishu. This record has previously spread through the literature through having been quoted by W. A. Stearns⁸, who erroneously attributed it to the late Napoleon A. Comeau, of Godbout, Quebec. Couper published⁹ a correction of this, stating that he himself wrote the paper in which the record first appeared.

Townsend and Allen¹⁰ refer to this record as "an exceptional and rather doubtful southern instance". Couper presented no details or other evidence to support the record and it is rejected by Baillie¹¹. It is the opinion of the present writer that it originated in error and that its rejection is warranted, for reliable data about the nesting of the King Eider that have since accumulated indicate that it does not nest on the Labrador coast south of northern Labrador and that it selects for its breeding-grounds treeless Arctic areas very different from the region in which this nesting is said to have taken place. If Couper did indeed find a nest of the King Eider on the north shore of the Gulf of St. Lawrence, it is almost certain that it must have been the nest of a bird prevented by injuries or other abnormal conditions from making its usual migration to the Arctic.

AB RED-BREASTED MERGANSER. *Mergus serrator*. — Very common and nesting at Watshishu.

B RED-TAILED HAWK. *Buteo borealis*.—Couper states that a nest containing young was found near Mingan by Sir Greville Smyth. There is no reason to question this.

B BALD EAGLE. — Said to nest on cliffs near Corneille River.

B PIGEON-HAWK. *Hypotriochius columbarius*.—Nesting.

AB WHITE PTARMIGAN. *Lagopus albus*.—The reference is, no doubt, to the species now known as. Wilson Ptarmigan, *Lagopus lagopus albus*. Couper says that a nest of this bird containing a few eggs was found at Kegashka. This presumably occurred on or shortly before July 5, 1867, for on that date he arrived at Kegashka and saw five eggs from the nest strung against the wall of a house. In recent years this species

has not been known to nest on this coast farther west than The Bluff Harbour, 35 miles east of Kegashka.

A SPOTTED SANDPIPER. *Tringoides macularius*.—Observed at Appeetetat Bay.

AB NORTHERN PHALAROPE. *Phalaropus hyperboreus*. — One shot, May 29, near Esquimaux Point.

AB BLACK-BACKED GULL. *Larus marinus*. — Nesting.

AB HERRING GULL. *Larus argentatus*. — Nesting.

AB ARCTIC TERN. *Sterna macroura*.—Nesting.

AB RAZOR-BILLED AUK. *Alca torda*. — Breeding on islands near Watshishu.

AB COMMON GUILLIMOT. *Uria ringvia* — Breeding on islands from Musquarro eastward.

B WHITE-WINGED GUILLIMOT. *Uria grylle*. — Nesting at Seven Islands.

B ARCTIC PUFFIN. *Mormon gracialis*. — Nesting in numbers on Perroquet Island, near St. John River. (It is worthy of notice that Couper makes no mention of Gannets nesting on this island.)

A BLACK-BACKED THREE-TOED WOODPECKER. *Picoides arcticus*. — One shot, June 27, at the first falls of the Natashquan River.

ABC CANADA JAY. *Perisoreus Canadensis*. — On June 8, at Watshishu, Couper encountered this species, "in company with its young, which were nearly fledged". "They were following their parents, flying from tree to tree, but their heads were covered with white downy feathers, therefore, I must have found them in the vicinity of their nest."

Four of this family group were shot by Couper, who found that "their stomachs contained abundance of a soft red berry that grows in swampy places on the plains. It is a species of cranberry, which ripens under the snow during winter." This was, no doubt, the fruit of *Vaccinium Oxycoccus* L., the small cranberry.

B RAVEN. — Said to nest on cliffs near Corneille River.

A ROBIN. *Turdus migratorius*. — Observed at Appeetetat Bay.

A WILSON'S THRUSH. *Turdus fuscescens*. — Couper recorded this species in the following words:

Next morning, [May] 30th, after breakfast. I wandered into the woods where I noticed.... Wilson's Thrush (*Turdus fuscescens*)...." This observation was made at "Attepetal Bay",

⁸ loc. cit.

⁹ The Canadian Sportsman and Naturalist, vol. III, no. 10, p. 275, Montreal, October, 1883.

¹⁰ op. cit., page 336.

¹¹ loc. cit.

doubtless the bay now known as Appeetetat Bay, or Baie Victor, about 3 miles east of St. Genevieve Harbour and 25 miles east of Havre St. Pierre.

There is no other record for this species in the Labrador Peninsula save that of Audubon¹², who states, "On the 20th of July, while in the latter country [Labrador], I saw the young of this species following their mother. They were there almost full grown, and could fly a hundred yards or so at a time. By the 12th of August none were seen, although during my stay they were as common as any other birds."

This record by Audubon was accepted at its face value by Townsend and Allen in their *Birds of Labrador*¹³, and such action may have been justifiable in 1907, in view of the paucity of knowledge of the birds of the north shore of the Gulf of St. Lawrence at that time. It seems to me, however, that these records of Wilson's Thrush, or the Veery, *Hylocichla fuscescens fuscescens*, in that region, should no longer be allowed to stand without question. My reasons for this view are as follows:

No one else has found this species in this region, although many capable ornithologists have visited it since 1907.

Most of the region is in the Hudsonian zone, and part of it is sub-arctic, and it does not appear to provide a type of environment suitable for the Veery. Audubon's record of young on the wing on July 20, 1833, was made at Little Mecatina Island¹⁴, where Hudsonian and sub-arctic areas intermingle and where nothing suggests the Veery's haunts.

When Audubon visited Labrador, as well as when he published the record quoted above, he was apparently unacquainted with the Olive-backed Thrush, *Hylocichla ustulata swainsoni*, for he does not describe or mention it in either his *Ornithological Biography* or his *Birds of America*. He did not know the Gray-cheeked Thrush, *H. minima aliciae*, for it was not described or named until 1858. Neither of these species is mentioned in the three publications by Couper, herein referred to, although they were generally known prior to 1867. Both of them are now known to be common in summer on

the north shore of the Gulf of St. Lawrence, where they undoubtedly breed. There is a general similarity of color-pattern and size among these three Thrushes, which no doubt confused the early ornithologists and concealed from them the fact that they are three different species and not all one species, *Hylocichla fuscescens*. The voices of the Gray-cheeked Thrush and the Veery are also very similar.

So common and widely distributed in suitable territory are the Olive-backed and Gray-cheeked Thrushes on the north shore of the Gulf of St. Lawrence that Audubon's party, working from Quetachu-Manikuanan Bay eastward to Forteau, must have encountered both of them frequently. Couper, who did not go east of Washikuti, must have met the Olive-backed Thrush and probably met the Gray-cheeked Thrush also. Since neither of these Thrushes was reported from the region under consideration by either of these scientists, both of whom, however, did report *Hylocichla fuscescens*, whose occurrence there is most unlikely, it is probable that their published records of the last-mentioned species in the region are really based on observations of the Gray-cheeked Thrush or of the Olive-backed Thrush or of both these species and should not be accepted as correct.

C GOLDEN-CRESTED WREN. *Regulus satrapa* Licht. — "I saw this species feeding its young at Mingan on the North Shore of the Lower St. Lawrence." Despite the explicitness of this statement, there is some ground for thinking that possibly Couper here made a slip of the pen or of the memory and really had in mind his observations recorded under the next species. The Golden-crowned Kinglet is rare in the vicinity of Mingan and there is no other record indicating that it breeds there. It may be that Couper actually saw two species of Kinglet feeding young at Mingan, but in his paper of 1868, in which he records such an observation of the Ruby-crowned species, he does not even mention the Golden-crowned.

A RUBY-CROWNED WREN. *Regulus calendula*. — Observed feeding its young in woods near the Mingan River, July 22.

AB YELLOW WARBLER. *Dendroica aestiva*. — Nesting at Natashquan.

BC BLACK AND YELLOW WARBLER. *D. maculosa*. — Nesting at Natashquan.

ABC BLACKBURNIAN WARBLER. *Dendroica blackburniae*. — Both sexes observed at Natashquan, June 20, but no nest found.

¹² Ornithological Biography, 2:362 Edinburgh, 1834.

¹³ Proc. Bost. Soc. Nat. Hist., 33:417.

¹⁴ Audubon and His Journals, by Maria R. Audubon, London, 1898, 1:406.

The only other record of this species in the Labrador Peninsula is that of Audubon¹⁵, who says, "In Labrador we saw several individuals of both sexes".

Despite the failure of other ornithologists to find the Blackburnian Warbler in this region there appears to be no good ground for setting aside these records, as the species is distinctly marked and well known, and there is undoubtedly a considerable southern influence manifest in the avifauna and flora of the immediate vicinity of Natashquan. A Blackburnian Warbler was taken on June 9, 1882, by the late N. A. Comeau, near Pointe des Monts, Quebec, about 60 miles southwest of the nearest part of the Labrador Peninsula¹⁶.

AB BLACK-POLL WARBLER. *Dendroica striata*. — Nesting.

¹⁵ *op. cit.*, 2:208.

¹⁶ C. H. Merriam, *Bull. Nutt. Orn. Club*, 7:234.

B REDSTART. *Setophaga ruticilla*. — Abundant at Natashquan. The present writer would rank it as "common" there in suitable habitats.

AB PURPLE FINCH. *Carpodacus purpureus*. — Heard singing at Appeetetat Bay.

B PINE FINCH. — Noticed.

B "Two species of Cross-bill". Noticed. There are very few records of *Loxia curvirostra* in the Labrador Peninsula.

A SNOW-BIRD. *Junco hyemalis*. — Observed at Appeetetat Bay.

AB WHITE-CROWNED SPARROW. *Zonotrichia leucophrys*. — Observed at Appeetetat Bay.

B WHITE-THROATED SPARROW. *Zonotrichia albicollis*. — Observed.

AB FOX-COLOURED SPARROW. *Passerella iliaca*. — A nest of this species, containing eggs, and built "in a low fir tree, about three feet from the ground", was found at Natashquan on June 15.

AVIAN MURDER

By P. A. TAVERNER

* Published by permission of the Acting Director of the National Museum of Canada.



FEW SUMMERS ago we were enjoying a sun bath near the top of the Murailles, those perpendicular cliffs that descend some seven hundred feet directly into the Gulf of St. Lawrence adjacent to the village of Percé, Gaspé County, Quebec. We were lazily watching a flock of Herring Gulls circling like white midges over the deep blue water far below, when a small brown hawk like a shadow was seen to dash out from the shore and pass through the idly interweaving gulls. A faint chorus of excited remonstrance rose to our ears and several gulls took after the intruder. One seemed to make momentary contact with it and at the touch the little raptor set its wings and glided down into the water. Immediately the larine excitement waxed fiercer, the whole flock set upon the helpless victim, and their white forms hid it from view. When they separated all that could be seen was a little brown jetsam floating inertly upon the sea. Most of the gulls turned away with loss of interest once their purpose was accomplished but occasionally one would re-

turn, give an extra precautionary dig and pass on. Even with good glasses it was impossible in the fleeting moment before the disaster to see just what species the hawk was but it gave the impression of a Sharpshin. Afterwards the remains were too nondescript to be recognized at the distance. We hurried to the village where we found our old friend Willie Duval and his gas boat and made haste from the south beach, round the great rock, and to the scene of the tragedy. But nearly an hour had elapsed and we discovered nothing. The tide was coming in and though we searched the bouldery talus shore minutely and scanned the smooth sea with care no *corpus delicti* could be found. Whether it was washed away by the tide or the gulls had made off with their prey could not be told. The species of hawk remains hypothetical.

The incident recalled a similar occurrence many years previous when fishermen at Point Pelee, Lake Erie, on returning from their daily-occupation gave us the bedraggled remains of a Sharp-shinned Hawk that they told us had been beaten down into the water and killed by the Herring Gulls off the tip of the point.

Another occurrence happened once on Bonaventure Island off the Percé mentioned above. We had dug out a Leach's Petrel from its nest burrow. It refused to leave the excavation, was taken in the hand and carried to the nearby verge of the great Gannet cliffs and tossed into the air. There are always a few Herring Gulls in this neighbourhood and as the little Petrel flew off seaward a number of them gave chase. It dodged here, there, one after another of its assailants, successfully ran the gauntlet, and disappeared to sea. It escaped, but only through its agility and erratic flight. The intent of its attackers was only too evident; one snap of their bills driven home and its fate would have been that of the two little hawks.

A case surprising because of the species involved was witnessed by J. S. Wallace at Point Pelee. He came upon a Red-tailed Hawk and a Raven in a final struggle on the public road. When he arrived on the scene the affair had already been transferred from the air to the ground. He had not seen the beginning of the attack nor which was the aggressor. If it had been started by the Red-tail it showed greater initiative and nerve than we usually associate with the Buteo group. If it was the Raven, its heart had proved greater than its bite. Probably it was the result of a casual feint giving an unexpected accidental advantage that was immediately pressed home. The hawk was shot, the Raven was already in its death throes. Both specimens were preserved; the Raven constituted the only recent record of the species in this part of southern Ontario.

A wanton case of murder occurred in a Ring-bill gullery on a small stony island near the north end of Lake Winnipeg. We had landed for inspection purposes. There were many young gulls in all stages of juvenility hiding between boulders and under weeds. A few of the better grown took to water and paddled off shore. The adults had taken wing and circled in great excitement over the lake near by. One bar-tailed, nearly grown juvenile, was swimming near shore. Whether it was a weakling, such as it seems a law of the jungle for, the strong to pick upon, was not noticed, but an adult winging past gave it a seemingly casual peck. The blow struck home with unexpected effectiveness and it was at once evident that the youngster was seriously affected. As if at a signal, at the sight of its disorganized struggles, a considerable proportion of the adults turned upon the unfortunate. On our approach they left their victim only to return as we re-

treated and the last seen was an array of waving wings accompanied by raucously excited voices surrounding a lifeless bunch of white feathers that drifted or was dragged farther and farther out over the lake.

A clear case of murder occurred in another Ring-bill gullery on the north shore of the Gulf of St. Lawrence. Photographing from a blind every detail was seen at close range. We were observing a couple of nests nearby, separated from each other by a little tongue of lush grass. Both nests had little spotted downy young. As a rule one parent brooded while the other stood about, making casual trips away and back again. The young remained in the shelter of the parental breast or momentarily wandered a few feet away. One from the nearer nest strayed a little farther than usual, around the separating point of grass and into the bailiwick of the neighbour. One of the guardians of the invaded territory unhappily returned at the moment, saw the little stranger chick, and ran to meet it. One stroke of the heavy bill at the base of the head and the deed was done. It worried the remains a moment or so and then left the tangled gray lump of down in the fly-infested sunlight, disregarded it the remainder of the day and tramped it into flat unrecognition during its regular patrolling. Throughout the episode the parent or parents of the innocent victim looked on unheeding and without interference or remonstrance.

A murder mystery story is recalled by the foregoing. It involved a mammal instead of a bird but falls in with the previously mentioned incidents and demonstrates again that nature is normally red in tooth and nail. We were working in towards the base of Point Pelee one spring morning. As we passed a little open glade in the heavy timber, a small body came hurtling down from overhead, landing with a dull thump on the ground. Another and another fell until four or five followed quickly. On investigation we found an equal number of quarter-grown Red Squirrels breathing their last in the short grass and dead leaves under the wide spread of a large walnut tree. Each had a small stream of blood flowing from a small puncture in the side of the neck. It looked like a Dracula vampire bite or the chisel-like incision of a squirrel's tooth. Was pater-squirrel jealous of his wife's attentions to her family? Was mater-squirrel impatient of her responsibilities? Was it a raid by a neighbour? Or was it squirrel's work at all? It was only circumstantial evidence and a process of elimination that

directed suspicion to the species' door. We searched with our eyes from below the branches of the great tree overhead from which the evidence fell but in the leafy screen could discover

nothing. No living thing stirred there nor could we perceive a hollow limb, trunk or other evidence of squirrel habitation. We departed in ignorance and still wondering.

SOME NOTES ON THE HABITS OF THE RUFFED GROUSE, *Bonasa umbellus*

By DAN McDONALD



WHILE DRUMMING, the Ruffed Grouse stands very erect, possibly tilting slightly backwards. While in this position the wings are brought forcibly forward, throwing the air from one wing against that from the other. This makes the booming sound. The wings do not touch the sides nor do they meet in front of the breast. When starting to drum they can stop at one, two, or three beats, but when fast motion starts they seem unable to stop and the writer, by proper timing, has run up and caught the birds in the hands. At this time they must be easy prey for the fox. It is not hard to see a bird drum, only a matter of time and caution. You can get within twenty feet and the bird will still drum although aware of your presence. During the proceeding they drum within a few seconds of regular intervals, usually, in the heat of the season, with about two minutes between.

The writer does not think that Ruffed Grouse suffer by death under the snow crust. They never enter the snow unless conditions are perfect. The snow must be soft and the weather very cold. On other nights they roost in trees in thick places. No snow drifts over them as they are never in a position where snow drifts. When they enter the snow it is always along a river or in an opening in the bush. They dive from a perch in a tree and hit the soft snow with some force. The only chance of getting killed would be to hit a sharp snag buried under the snow. They dive in about dusk or just before and then work their way under the snow about two feet from the opening. If you endeavour to catch them in the snow, as I have done many times, they come out in full flight without struggling, making it impossible so to trap them.

One reason for the difference in the number of eggs in the nest is because they sometimes eject their eggs while in flight. I have, on one occasion, observed a bird flying over camp to drop an egg that fell on a manure pile, un-

broken. I took the egg to a nest and put it along with others. It hatched, showing that it was not disease that caused the dropping. I have also noticed grouse eggs broken on bare rocks and wondered if they were stolen and dropped, but now I am certain that on some occasions they lay flying.

There is no evidence that rain kills the young. In very wet Junes we have as large coveys as in dry Junes. That cause of decline in numbers is not real. In fifty years with the grouse I find that they change in numbers greatly in two months and always in the summer. In 1924 I had 200 men peeling poplar pulp. These men showed me more nests than I have seen in the rest of my life. Grouse or, as we call them, Partridge were everywhere. The eggs hatched but by the time the peeling season closed, July 25th, there were no birds left. This shows plainly that they die in June and July. As this very marked decline in numbers was general from Nova Scotia to western Wisconsin in the United States and to Kenora in Canada, it tells us that disease, not weather, was the cause.

The writer never saw a bird under the snow crust in fifty years in the bush or a dead bird when the snow was leaving. In a country where, at times, there are many birds this should have been noticed if it happened at all frequently. I have never talked with a real bush man who ever found such a condition, so we can eliminate crusting also as a cause for general mortality.

Human beings have had little effect upon their numbers. In seasons when very plentiful many are killed but there are as many next year. The area they cover is so great and human population so few that it has little effect. I would place the bear as their greatest enemy. Bears eat their eggs, catch their very young, and hunt all the time. When their nest is destroyed I have never been able to discover whether they lay again or not; they certainly never do so in the same nest. (Sault Ste. Marie).

THE EUROPEAN STARLING (*Sturnus vulgaris*) IN ALBERTABy **FRANK L. FARLEY**

ON OR ABOUT May 21st, 1934, Mr. Laurie Blades, teacher of Hartland school, located fourteen miles due east of Camrose, noticed a strange bird fly from the belfry of the school and alight on a fence post a short distance away. Later in the day, both teacher and pupils saw the bird many times as it carried nesting materials into the belfry. Entrance to the closed tower was by way of an old nesting-hole of a Yellow-shafted Flicker. At the time Mr. Blades believed the stranger to be a Starling. Although a close watch was kept for its mate it was never seen. On May 25th, Mr. Blades made an inspection of the nest and found it to be a bulky affair in which were three light-coloured, unspotted eggs, one of which he collected. About a week later he came into Camrose to inform the writer of his find but on account of my absence from home was unable to do so. He then referred the matter to Mr. Frank Crossley, R.C.M.P., one of our local bird-men, and asked him to go out and check up on his identification. This, Mr. Crossley did on June 12th, when he examined the nest and eggs, but the female had disappeared and had not been seen since the 5th of the month. Mr. Crossley, who was well acquainted with starlings in his boyhood days in England, had no hesitation in stating that the nest and eggs belonged to that species. He collected the six eggs and on my return from Hudson Bay gave them to me. I immediately sent them to Mr. Taverner for identification and deposition in the National Museum. Later Mr.

Blades learned that the bird, or one similar to the one that nested in the belfry, had been seen in a barn a few miles north of the nesting site.

In a letter to the writer, Mr. Taverner says: "Your record of the Starling near Camrose is indeed interesting, and an enormous jump from our last previous record at Fort William, Ontario. That it was breeding suggests more Starlings in the immediate future. We have been wondering whether Starlings would find the prairies congenial; probably our next surmise is whether it will cross the mountains. It looks as though it will finally inherit the continent as the House Sparrow has. Any further reports on the subsequent history of the species will be welcome."

The appearance of this solitary starling so far from its nearest known companions presents some interesting problems. One of the most likely explanations for its occurrence here is that it arrived in a box car from Fort William or some other point further east, and did not gain its liberty until it reached one of the stations in the vicinity of where it was found nesting, probably Ohaton or Bawlf, only a few miles distant.

Another supposition is that a colony of these birds may have established themselves somewhere on the prairies east of here, and this straggler, or even a pair of them may have travelled westward, the male possibly being accidentally killed on the journey. The former seems the more plausible.

ON THE ACCIDENTAL PASSAGE OF BIRDS ON SHIPS FROM CANADA TO THE BRITISH ISLESBy **J. A. STEVENSON**

ON May 24th of this year, [1934] I embarked upon a cattle-steamer at Montreal, that was taking a cargo of live cattle to Birkenhead, Eng. In order that the cattle might be landed in good condition, a large number of bales of hay and bags of grain were taken on board at Montreal, with which to feed them throughout the voyage. This re-

sulted in the decks of the steamer being somewhat liberally covered with the seeds during the trip: and one result of this became apparent when we were steaming down the Gulf of St. Lawrence toward Cape Race, Newfoundland. A number (about six or seven) of Chipping Sparrows came aboard, and busied themselves about the deck eating the loose grain. This appeared to

attract them so much that they were inclined to linger on board until land was far astern. However, before we left Newfoundland out of sight, all but one of the birds had disappeared, having presumably flown to land. The weather was very fine, and it is to be assumed that they had no difficulty in flying the ten or twelve miles necessary. The Chipping Sparrow remained on board, through fair weather and foul, scurrying about the deck and keeping out of the way of the men, until June 2nd, when we sighted the south coast of Ireland, when it, too, disappeared.

I inquired of some of the more experienced cattlemen about the birds, and was informed that "Them's 'ay-birds: there's always a few on board. Sometimes as many as a dozen go all the way across on the boats."

Immediately upon leaving Newfoundland, we ran into dense fog-banks; and these continued until May 29th. On that day I was up in the bow, when I was very much surprised to see a small bird come flying toward the ship's port side from afar off. Its flight was weak, and it seemed very glad to be able to find something firm to perch upon as it alighted upon the deck. I had no difficulty in identifying it as a White-crowned Sparrow; and it allowed me to creep very close to it, it apparently being nearly exhausted. I saw that its feathers were much dishevelled, as if it had flown a long way, probably through the fog we had just left behind us. Possibly it had become lost in the fog and would have perished had it not seen the ship. This bird, too, accompanied us all the way to Ireland, when approximately at the same time as the other, it flew off the ship.

These two cases seem to indicate, and particularly the first one, that it is no uncommon thing for birds to pass on ships from the New to the Old World. It seems likely that the cattle-steamers, carrying abundant food upon their decks for small passerine birds, are more res-

possible than other ships, such as liners and other cargo vessels. When it is considered that throughout the whole year twice or even three times a week, cattle-steamers are leaving Canadian ports for England, not a few birds must have made the passage; and this fact should be taken into account in such cases when typical North American species are captured in the British Isles. That British or European birds are carried over to this side is far less likely, because there are no cattle-steamers bringing cattle to this side, hence any birds that do land on steamers coming west are likely to die from starvation before they reach land. The possible exception is the fast transatlantic liners, which can do the trip in from four to six days.

Mr. Douglas Leechman informs me that others, in speaking of the passage of small birds on board ships, have said that the birds greatest difficulty on board ship was in finding drinking water rather than food. On these cattle-ships, there is an abundant supply of fresh water, which is used for watering the cattle during the passage over to Europe; and in, I believe, practically all cases, a portion of this water is always kept handy in large, open tanks situated on the decks on which the cattle are. It should be a comparatively simple matter for birds to drink this water when the cattlemen are not around to disturb them; and in any case, in the actual watering of the cattle, many bucketfuls are upset by the cattle themselves into the feeding troughs, which likewise are easily accessible to small birds that are not afraid of close proximity of cattle. Hence, there is an abundant drinking-water supply at hand always for the birds, and upon the cattle-ships it is unlikely that, when cattle are on board, the birds would die of thirst.

NOTES ON MAMMALS OF THE UPPER LIARD AND FRANCES RIVERS

By CHARLES ELTON



THE FOLLOWING NOTES upon Rocky Mountain marmots were found in an apparently unpublished letter written by Robert Campbell, whose exploration work on behalf of the Hudson's Bay Company, of which he was later on a Chief Factor, is well

known. The letter was copied by me from the original, in the course of an investigation into the Hudson's Bay Company's archives in London, and I have to thank the Governor and Committee of the Company for permission to publish it here. I owe thanks also to the New

York Zoological Society who financed the investigation and to Dr. R. M. Anderson for the valuable comments which he has added. As Campbell's letter apparently accompanied specimens which had been asked for by the British Natural History Museum, I enquired from Dr. M. A. C. Hinton whether any were still in existence. The only marmot skin received from the Company and mentioned in the Museum catalogue was one in the middle of the nineteenth century, labelled *Arctomys monax*, and marked "duplicate". It had not been kept. If Campbell collected any skins or skulls, they are not in the British Museum, though he may possibly have sent specimens to museums in the United States, which began to receive some Mackenzie River materials through the Company about this time. Frances Lake post was established by Campbell in the summer of 1840, and was known at first as Glenlyon House. It lay at the head of Frances River, the north branch of the Liard River, and was for eleven years a connecting link for transport of the fur business from the Mackenzie River Valley into the Upper Pelly River (to Pelly Banks and Fort Selkirk). Frances Lake post was apparently abandoned in the summer of 1851, after a great deal of danger and hardship had been experienced.

The opening of a different portage route over the dividing mountains by Peel River and La-Pierre's House, rendered the Frances Lake route no longer necessary. This statement is based on Hudson's Bay Company official correspondence; also on Campbell's private diary, which includes a vivid account of this period, is well known, but has never been officially published. I am indebted to his grand-daughter, Mrs. J. W. Waddic, for permission to use material from this diary. J. L. Lewes was in charge of the Mackenzie River District, at Fort Simpson. Although the letter was not specifically addressed, it formed part of a series of official letters addressed to Lewes. —

Campbell's notes are very interesting, particularly in his differentiation of the various forms of marmots, ground squirrels, and chipmunks, most of which had not been scientifically described at that time. Very little exploration has been done in that particular region (Frances Lake, Yukon), and almost no zoological collect-

ing. About the only white men who have made observations since Campbell's time are Dr. G. M. Dawson and Dr. Charles Camsell of the Geological Survey, Warburton Pike (prospector and gentleman sportsman), Fenley Hunter (explorer and big game hunter), and a few odd trappers. In spite of the fact that there has been little zoological work done in southeastern Yukon, we have quite a bit of material from southwestern Yukon and northern British Columbia, as well as from the country on the east side of the Rocky Mountains in that region, so that the mammal life is fairly well known in the surrounding areas. Campbell gives enough information so that I think I can be fairly certain in determining the names of the species he mentions. I have written some footnotes giving my ideas on various points in the Campbell manuscript.—R. M. ANDERSON.

Frances Lake, September 29th, 1843. (Robert Campbell to J. L. Lewes).

"The only specimen of mammalia I have been able to procure for the British Museum is 6 *Siffleus*¹ of the large kind, viz., an adult male and female, likewise a male and female of the last season and two females of this season, all taken the first week of this month (September), but I am sorry they are all imperfect from the skull and bones of the head being ignorantly mutilated by the Indians who procured them. I can neither give their scientific name or what species of the Mando² (sic) family they belong to, whether they be the Rocky Mountain Badger³

¹ "*Siffleus*." The ordinary spelling is *siffleur*, pl. *siffleurs*. French for "whistler." The name is still in use for the large Hoary Marmots of the north-western mountains. Probably Campbell wrote the word as it is pronounced.

² "Mando family" should probably read "Marmot family."

³ "Rocky Mountain Badger." The true Badger (*Taxidea taxus*) is found in the Rocky Mountains farther south as well as in the southern interior of British Columbia, but does not occur as far north as the Frances Lake region. Some of the white traders still call the Hoary Marmots "badgers", as the size and general colour of the animals are somewhat similar, although the marmots are rodents and the badgers are carnivores. (See discussion of this point in "Notes on Distribution of the Hoary Marmots," by R. M. Anderson, *Can. Field-Naturalist*, vol. 48, no. 4, April, 1934, p. 61.)

Marmot⁴, or the Siffleus. The latter name is derived from their shrill whistle, which is exactly like that of a person giving notice to a companion at a distance. The length of a large full-grown (one) from nose to tail is about 30 ins., and tail 7 ins. As the skins of the above are forwarded it is unnecessary to say anything of their generic character, etc. As to locality, habits, etc., they inhabit the high ridges of the Rocky Mountains, where they are in large colonies or societies, burrowing among and under the crevices of the fallen rocks. Their food appears to be entirely vegetable, of such herbs as grow in their vicinity, which they collect with great industry during the summer season. Towards the latter part of their busy harvest—being then very fat—the Indians take them by snaring in great numbers, their flesh being considered a great delicacy, as in fact is all greasy things to their palate. On the first appearance of snow they disappear into their burrow, which is generally about the 15th or 20th of September.

I am sorry I have not been able to procure a specimen of all the different kinds throughout this quarter and by the voyagers and termed Siffleus promiscuously, of which there are a great variety. The next family in point of size and importance to the above are the Rust-coloured⁵, which also affords a rich harvest to the Indians for their flesh and skins; of the latter they make fine robes. Those also inhabit the Rocky Moun-

tains and like the former are in societies above the foot of the highest rocks, and in like manner burrow in the dry ground among the accumulated fragments of fallen rocks. Their general habits and food seem to be similar but their cry is somewhat different. In company with this last kind, or perhaps more correctly, in the suburbs of their villages are found the ground-squirrel⁶ and likewise the small "S'wiss."⁷ They burrow among the stones and hillocks of sand, and like sentinels are found scattered here and there for perhaps miles round the main village, that it is impossible to approach from any quarter but an alarm is given and spread before the intruder; and although different they seem to form but one sociable community, and apparently pursuing the same avocation, procuring food. The latter kind are very common about the mountains. I saw them in large numbers when I crossed from Dease's Lake to Stikine River and likewise last summer on a mountain — Schiehallion — I ascended along the Pelly River. And along the lower part of the Pelly there is another kind called by the Indians the Black Siffleus⁸. I saw a great many of their burrows generally about rocky banks and rapids, and to the very edge of [word missing] and heard their shrill chirping cry very often, but neither saw nor killed any; they are said to be larger than that termed the ground squirrel. And there is also the solitary Wood Siffleus⁹, which is somewhat larger than

4 "Marmot, or the Siffleus." By "marmot," the writer probably means the smaller woodchucks, called "*marmotte*" by the French-speaking Canadians (see below). The "siffleus" referred to are undoubtedly the Hoary Marmots, *Marmota caligata* (Eschscholtz), described in Zool. Atlas, part 2, P. 1, pl. 6, 1829, with type locality near Bristol Bay, Alaska. This species in several subspecies or geographical races ranges from mountains in Idaho northwest to northern Alaska. The form found in southern Yukon is considered to be intermediate between the typical Northern Hoary Marmot, *M. c. caligata* (Eschscholtz) and the Robson Hoary Marmot, *M. c. ozutona* Hollister, described from the vicinity of Mount Robson on the Alberta side. The latter form averages larger and considerably darker in colour. There is, however, considerable variation in colours of pelts due to age and season, as well as individual variation, so that exact determination of specimens is not always possible from skins alone.

5 The "rust-coloured" species which is mentioned is probably the Ochraceous Woodchuck, *Marmota monax ochracea* Swarth, 1911, a sub-species of the smaller Eastern species of Woodchuck or "Groundhog," now known to range in the interior mountains of Yukon and northern British Columbia, from Fortymile Creek south to the Babine Mountains and possibly to Stuart Lake.

6 "The ground-squirrel" of this region is probably the Bennett Ground Squirrel, *Citellus pleisius pleisius* (Osgood), described from Lake Bennett region in 1900. We have no very definite records from the southeastern part of Yukon, but the Fort Yukon Ground Squirrel, *Citellus osgoodi* (Merriam), 1900, is quite definitely arctic, and the Columbian Ground Squirrel or "picket-pin," *Citellus columbianus* (Ord), 1815, is not known to occur nearly as far north.

7 "The small 'S'wiss'" is undoubtedly the chipmunk, which is still known as "*suisset*" by French-Canadians. The form found in Yukon is the Gray-headed Chipmunk, *Eutamias minimum caniceps* Osgood (1900). This form intergrades with the Mackenzie form, *Eutamias minimum borealis* (Allen) in northern British Columbia, and the latter form also occurs on lower Liard River, so that Campbell probably came into contact with both forms. Specifically, the animal may safely be referred to as *Eutamias minimum*.

8 The "Black Siffleus" are very likely melanistic specimens or possibly small local colonies of melanistic groups of the Ochraceous Woodchuck, *Marmota monax ochracea*. Nearly all the races of woodchucks produce frequent melanistic specimens, which vary from glossy black through different shades of dark brown to the normal phase. The fact that the writer states that they are larger than the ground squirrel, without mention of the big Siffleur, seems to indicate the smaller woodchuck.

a musquash [muskrat]¹⁰, of a light brown colour. They are but rare, but are found occasionally along this [Frances River] and the Liard River.

⁹ "The solitary Wood Siffleus," might be explained by the common tendency of the natives to attribute specific differences to animals which have adopted habits varying from the normal condition of their species, such as "bank" beaver, and "house" beaver. The size, colour, and habitat of the animal mentioned seem to indicate the so-called British Columbia Woodchuck, *Marmota monax petrensis* Howell (1915), which has been taken in a few localities in the eastern interior of British Columbia, but the range is not yet well known. Howell (*Revision of the American Marmots*, 1915, p. 33) states: "This subspecies has no direct connection with [*Marmota monax*] *monax* or [*Marmota monax*] *rufescens*, its range being sep-

arated from theirs by an extensive area of plains, but it undoubtedly intergrades with *ochracea* on the north and possibly with [*Marmota monax*] *canadensis* through some of the passes of the mountains in southern British Columbia." The National Museum of Canada has two melanistic specimens, one from the type locality, Revelstoke, B.C., and another recently from the region of Burns Lake, B.C. As the U.S. National Museum has specimens referred to *M. m. canadensis* from Fort Simpson and Fort Liard, the area of intergradation with British Columbia and Yukon forms may very well run through the more northerly passes of the Rocky Mountains.

¹⁰ "The musquash" or muskrat of the region in question is without doubt the Northwestern Muskrat, *Ondatra zibethica spatulata* (Osgood), which ranges from northwestern Alaska to east of the Mackenzie, and south to north-central British Columbia and Alberta.

(Footnotes by R. M. Anderson, Ottawa, Nov. 21, 1934.)

NOTES AND OBSERVATIONS

NESTING OF AMERICAN COOT. — This note is to record the nesting of an American Coot at Toronto during the summer of 1934. On June 24th, 1934, two adult coots and seven downy young were seen in one of the marshes in the Humber valley. The group was observed from across the river using a 47x telescope. The black bodies, red bills, and orange fuzz on the heads of the young coots made quite a striking picture against a background of blue water and green cat-tails. The adults and five of the young were observed again on July 1st. The adults were observed feeding the young with various kinds of animal food, chiefly snails, while we were watching. Young Virginia Rails in the same marsh were being fed on a similar diet with the addition of earthworms. Young Gallinules, on the other hand, were being fed on pondweeds and other plants. Coots have wintered in Toronto for the past two winters and one is present in the marsh where they bred last year. No evidence of breeding has been observed this year. — J. MURRAY SPEIRS.

FIRST TORONTO SPECIMEN OF HENSLOW'S SPARROW. — On May 12, 1934, Mr. M. Berry of Toronto found a small sparrow dead in his garden. Recognizing the bird as unusual, he brought it to the Royal Ontario Museum of Zoology, where it was indentified as the western form of Henslow's Sparrow (*Passerherbulus henslowi henslowi*) The specimen, No. (34.5.143)

is the first to be taken in the Toronto region although the species has been reported as breeding in this region [Erindale] by Richardson (*Can. Field-Nat.*, Mar., 1933, p. 58). — L. L. SNYDER.

PIED-BILLED GREBE FROM BAFFIN ISLAND. — There has been added recently to the bird collection of the R.O.M.Z. a male specimen of Pied-billed Grebe [*Podilymbus podiceps*] (dressed in the rather vague first winter plumage) which represents a remarkable locality record.

The specimen was taken by a native during the first week of "November, 1932, at Fair Ness, near Amadjuak, Baffin Land". The Rev. Mr. L. W. Bailey, who was resident in Baffin Land at the time, preserved the bird and forwarded it to the Museum.

Although the record is nothing more than an extraordinary straggling occurrence north of the limits of the range of the species, it constitutes the first record for Baffin Land. The nearest recorded occurrence is apparently that of Hantzsch (*Canadian Field-Naturalist*, 42:89, 1928) who records a specimen taken at Ramah, in Northern Labrador. — L. L. SNYDER, *Royal Ontario Museum of Zoology*.

A YELLOW RAIL (*Coturnicops noveboracensis*) FROM CLARKSON, PEEL COUNTY, ONTARIO. — Since there is a paucity of details as to the

distribution of Yellow Rails, at any season, the following is recorded. A specimen of this species was captured by R. W. Millard at Clarkson, Peel County, Ontario, on May 7, 1934. The bird, now R. O. M. Z. No. 34.5.9.32, is a female. This is the second spring specimen for the Toronto Region. — C. E. HOPE, *Royal Ontario Museum of Zoology*.

STARLINGS (*Sturnus vulgaris*) BATHING ON A COLD DAY. — In the January, 1932, issue of *The Canadian Field-Naturalist* there appeared a short note entitled "Starlings Bathing in Winter" by Hoyes Lloyd. Mr. Lloyd makes mention of a curious incident related to him by several persons who observed Starlings bathing with the temperature between 0°F and 10°F and immediately upon flying up to the branches of a tree, the birds became encased in ice. This took place about January 15, 1931, at Ottawa, Ontario.

On February 12, 1933, the writer had a similar experience in Cedarvale Ravine, Toronto. The weather was clear and cold with the temperature between 2°F and 15°F. A small creek flowing though the ravine is joined at several points by sewer outlets, which pour into its stream warm putrid water. About twenty Starlings were bathing, and after leaving the water, would perch in sunny sheltered spots along the creek bank to dry and preen their feathers. Upon my intrusion they flew up into the branches of some trees nearby and immediately became encased in ice, so that they were unable to use their wings, but came tumbling down the moment they attempted to fly. On reaching the ground they apparently realized their helplessness and sought to escape by hiding under stumps and other inaccessible places. Despite their attempts to escape five were captured.

At the same time about fifty Cedar Waxwings were present. Many of them came down to drink from the stream but none attempted to bathe. — C. E. HOPE.

THE TENNESSEE WARBLER (*Vermivora peregrina*) IN THE MAGDALEN ISLANDS. — On June 18, 1934, when searching a small swamp on Grindstone Island, in the Magdalens, I came across a male Tennessee Warbler in full song. The locality was ideal for its nesting. This is apparently the first record of the species from the Magdalens.

In compiling a list of the birds of these islands, based on the publications of Cory, Young, Brewster, Bishop and Job, 141 species have been recorded from the Magdalen Islands, although a number of these records are somewhat doubtful. (cf. Young, *Auk* Vol. xlvii, 1931, p. 245, who gives the number of birds known from the Magdalens as 115). — JAMES BOND, *Associate in Ornithology, Academy of Natural Sciences of Philadelphia*.

ORANGE-CROWNED WARBLER, IN NOVEMBER. — The occurrence of Warblers is not often noted at Toronto in November, although species have been seen on the Christmas Bird Census in certain years.

On November 25th, 1934, while walking along the beach at Fisherman's Island, Toronto, I picked up a dead female Orange-crowned Warbler [*Vermivora celata*] which was lying on the sand. The plumage of the bird was quite dry, as it was found beyond the reach of the waves, though somewhat ruffled, so it would seem that it had not left the shore nor had it been washed up from other parts.

On being made into a skin it was found to be quite fresh and with considerable fat; the stomach contained remains of insects and there was no wound anywhere.

To recall the weather of the previous few days: the 24th was cloudy and dry with strong north-west winds; the 23rd, mild and cloudy with rain and fog at night; the 22nd, mild and clear; so that in these parts at least the bird could have eked out an existence; in fact, today (December 2) I found several flies in mild sheltered corners and a lady-bird beetle on the shore. With its dry plumage, it would seem that the bird must have died since the rain of the 23rd. — STUART L. THOMPSON.

WINTER GOLDFINCHES NEAR QUEBEC CITY. — On January 30, 1935, my wife and I collected a pair of Eastern Goldfinches (*Spinus tristis tristis*), near Lac Bonhomme, some fifteen miles north-west of Quebec City.

Dionne's *Les Oiseaux de la Province de Québec* does not record the species at this season; in *Birds of Massachusetts and Other New England States*, Forbush says that it winters from southern Quebec southward; and Dr. Harrison F. Lewis writes me that he has no winter record in his own notes for the Eastern Goldfinch near Quebec City. — GUSTAVE LANGELETIER.

ARCHAEOLOGICAL EVIDENCE OF THE PRESENCE OF THE WILD TURKEY IN SIMCOE COUNTY, ONTARIO.—In an article on "Archæology as an Aid to Zoology," *Canadian Field-Naturalist*, 33: 68-70, 1919, I attempted to show how the prehistoric range of the wild turkey could be determined from archæological finds of its bones. The farthest northern archæological record of the presence of the turkey in Canada then was in Whitchurch township, York County, Ontario, about 20 miles north of Toronto. Since then I have secured two additional records which extend the northern range considerably. In 1926 I found some bones in refuse deposits of a Tionontati Indian village site near Creemore, Simcoe county, about 48 miles northwest of Whitchurch township. More recently Mr. T. G. Connors of Goderich, Ontario, found a humerus in a refuse pit at a post-European Huron village site on lot 6, concession IX, Tay township, Simcoe county, about 56 miles north of the Whitchurch township site. While it is possible that the bones are those of birds that were killed farther south than the localities where they were found, it is just as likely that they had been killed in the vicinity of the sites.—W. J. WINTERBERG.

THE LITTLE BLACK BULLHEAD (*Ameiurus melas*) AS AN AQUARIUM FISH.—Two years ago last September, (1934) I noticed a string of tiny Black Bullheads following their leader, as they do, on the surface of Sturgeon Creek, Winnipeg, and, conveying 100 of these to the aquarium, I found they continued the same habit of following the leader everywhere round the aquarium, attracting more interest than the goldfish by their orderly activity. Many asked for them to

try in their aquaria, and they have proved hardy and successful. Mine are now four inches long, very active and attractive, and seem in no way to interfere with the goldfish, going about their own business and feeding in an entirely different way.

There seems no reason why the little Black Bullhead cannot be successfully used in any house aquarium.—V. W. JACKSON.

A LARGE MOVEMENT OF THE TERRESTRIAL FORM OF THE COMMON NEWT (*Triturus v. viridescens* (Harlan)).—On the twenty-fourth of May, 1933, Messrs. T. M. Shortt, A. H. Shortt and the writer were exploring the talus slope on the escarpment at Credit Forks, Peel County, Ontario. We were astonished to find the terrestrial form of the newt scattered along the slope in very large numbers. Where the upper end of the talus slope terminated at the base of a wall of limestone, many could be seen attempting to climb the almost perpendicular wall some thirty to forty feet in height. Many were succeeding in their attempt, as numbers of them were seen scattered at various heights on the face of the wall. On the level ground above they were found in fewer numbers. We gathered specimens at random, putting them into our binocular cases and, when later counted, found we had over one hundred individuals. Many times this number could have been secured.

Mr. R. J. Rutter of Toronto has informed me that on July 19, 1931, he found the aquatic form of the newt quite common in ponds in some old limestone quarries on the level area above the cliff described.—C. E. HOPE, *Royal Ontario Museum of Zoology*.

REVIEWS

A GUIDE TO BIRD SONGS, by *Arctas Saunders*. D. Appleton-Century Co. and the Ryerson Press, Toronto. 8vo. pp. 285, 163 song graphs. Price \$3.00.

Mr. Saunders has long been known as a careful student of bird song. In this little book he has presented the results of long and discriminating familiarity with the voices of most of the birds of eastern North America. More birds can be recognized in the field by ear than by eye but it has been among the difficulties that memory is fleeting, ear knowledge personal, and the experience of one can rarely be transmitted to an-

other. Various syllabifications have been found more or less useful in conventionally rendering bird sounds but, even when accompanied by musical notes, the result has been mostly disappointing. Birds do not enunciate clearly in any human language and do not follow any of our recognized scales or tempos. However pleasing their notes may be, they do not make music in the formal sense of the word. Mr. Saunders has abandoned these traditional methods of song recording and developed a system that seems to render bird songs in a manner more exact and satisfactory than any that has heretofore been current.

He represents the sound by a line, broken or connected as the occasion calls for. Length, indicates duration of time; weight, the intensity or loudness; and relative position, up or down the pitch. Distinct changes of notes are connected by vertical lines and slurs by curved ones. Qualities are represented by syllables that are rarely twisted into intelligible words. The pitch of the opening note and the distinctive timbre are suggested in a short heading.

The reviewer has long used a crude version of this method for recording particularly distinctive songs with some success. At least with notes so made he has often been able to recall a working version of songs long buried in subconscious memory. This proves the practicability of the system as developed and improved by Mr. Saunders and, even if some of the song diagrams given are difficult of interpretation to the mental ear, they introduce the bird student to a system that he can practice for himself and enable him to make records that will assist his own memory and be a basis of comparison with the experience of others. Undoubtedly this little book will be of great value to the field student. We foresee that in the future many note books will be filled with short-hand hieroglyphics which will greatly increase their value. —P. A. T.

THE HAWKS OF NORTH AMERICA, *Their Field Identification and Feeding*, by John Richard May. Illustrated by Allan Brooks and Roger Tory Peterson. Published by The National Association of Audubon Societies, 1775 Broadway, New York. Quarto, pp. 140, 37 full page plates in colour, 4 in black and white. Price \$1.25.

"Give a dog a bad name and hang him" is an old aphorism. Our hawks have suffered severely under the human prejudice thus expressed. True, some hawks occasionally take chickens and birds of economic value, but all hawks, good or bad, have been popularly damned for the deeds of the few. Any hawk is generally deemed a legitimate target for any gun

until the sight of a bird of prey living freely is an unfortunately rare experience over much of the country. We are neither hawkphobe nor hawkophile. Our attitude is that the hawk question is one of geography and circumstance with the preponderance of evidence greatly in favour of the hawk. Like humans there are many decidedly good hawks and a few bad ones. Occasionally good hawks get perverted, out of place or pinched by necessity. To mete out indiscriminate destruction to some of our importantly good friends on account of a few undesirables is like jumping over a precipice to cure a tooth-ache. The general popular attitude is, — "We cannot tell one hawk from another; all hawks look alike to us and we take no chance of allowing a possible criminal to escape". But too often there may be an under-current of, — "Besides, we like it, not only the shooting but the glow of virtue we feel in ridding the world of what we regard as a malefactor".

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PECTINATELLA IN RAINY RIVER DISTRICT, ONTARIO

By T. L. TANTON*



IN SEPTEMBER, 1934, the writer observed several living colonies of the freshwater bryozoon, *Pectinatella magnifica*, in a creek flowing from the north into the Seine River half a mile east of Partridge Crop Lake. This locality (approximately 48°44' N. and longitude 92°21' W.) is about 12 miles easterly from Mine Centre station on the Canadian National Railways in Rainy River district, Ontario.

For the identification of the organism the writer is indebted to Prof. W. J. K. Harkness of the Department of Biology, University of Toronto, to whom a description and photographs were submitted. From him and Mr. Douglas Leechman, of the National Museum of Canada, it was learned that the occurrence herewith reported is the first from Rainy River district and is at a locality farther north than any hitherto reported in the scanty literature relating to freshwater bryozoa in Canada.

The writer had not previously observed the organism in Northern Ontario and was not acquainted with its retiring habits, timidity and sensitiveness to shock. Upon approaching the creatures in a canoe each colony presents the appearance of a greyish white ball or bulging mass of jelly. After regarding them attentively for some time without detecting any motion or change of appearance, the writer's method for making closer inspection was to split them with a paddle.

It is doubtful whether the expanded polyzoa in all their beauty can be observed in their native habitat from a canoe. Those familiar with the creatures recommend that the colony be carefully transferred to a collecting bottle with water, and set in a shady place convenient for observation with a hand lens. The protrusion and unfolding of the polyzoa is said to be well described in the following passage¹:

* Published with the permission of the Director, Bureau of Economic Geology, Department of Mines, Ottawa.

¹ STOKES, ALFRED C.: *Aquatic Microscopy for Beginners*. Fourth edition. John Wiley & Sons, New York; p. 225 (1918).

"Perhaps while you gaze at the jelly, a pink little projection appears within the field of your lens, slowly lengthens and broadens, retreating and reappearing it may be many times, but finally, after much hesitation, seeming suddenly to burst into bloom. A narrow body, so deeply red that it is often almost crimson, lifts above the jelly a crescentic disc ornamented with two rows of long tentacles that seems as fine as hairs. They glisten and sparkle like lines of crystal, as they wave and float and twist the delicate threads beneath your wondering gaze. While you scarcely breathe, for fear the lovely vision will fade, another and another spreads its disc and waves its silvery tentacles, until the whole surface of that ugly jelly-mass blooms like a garden in Paradise—blooms not with motionless perianths, but with living animals, the most exquisite that God has allowed to develop in our sweet waters." If then the water be jarred, even slightly, the polyzoa flash their tentacles together and dart backward, out of sight, into the jelly mass. Within a few minutes, if undisturbed "the little bodies again slip outward, the crescentic discs again spread open, the shining tentacles unfold and curl and lash the water, until once more the ugly jelly mass becomes a thing of undescrivable beauty. This is *Pectinatella*, well named the magnificent".

HABITAT.

The creek in which the colonies were observed has an average width of about 25 feet and depth of 5 feet for a distance of ¼ mile above its junction with Seine River. Farther upstream it is a mere rill flowing swiftly through a rocky, hilly area. In its lower part it is entrenched in a clay plain. The current is very sluggish and the water is brownish and turbid. Several varieties of water plants grow from the creek bottom; and alders, with projecting, submerged, dead branches, line the banks. Fallen trees and logs, partly submerged, occur along the shore at a few places.

COLONIES:—DISTRIBUTION AND ATTACHMENT.

About a dozen colonies were observed in the lower part of the creek distributed over a dis-



Fig. 1. Colonies of *Pectinatella magnifica* in creek east of Mine Centre, Ontario.

(Photo by T. L. Tanton, Geol. Surv., Canada).

tance of nearly $\frac{1}{4}$ mile. All were found near the surface of the water, none at a greater depth than 2 feet. The majority were attached to submerged dead branches of bushes, one was attached to a partly submerged log and one to the stem of a living water plant.

SIZE AND SHAPE.

The colonies have the general appearance of simple globular masses from 4 inches to 1 foot in diameter and in some cases compound globular masses apparently formed by the growing

together of two or more of the simple type. One colony of the compound type with a maximum dimension of 2 feet almost encircled a partly stranded floating log to which it was attached; in this case the colony was bounded by a plane coinciding with the surface of the water. This plane was smooth, structureless and coated with green slime possibly an algal growth. Presumably the growth of bryozoa had been arrested at the surface of the water while the submerged part of the colony continued to thrive.

A typical colony has the appearance of a globular mass of clear jelly encased in a thin granular greyish-white skin. The surface is netted with a system of branching white lines that faintly delimit numerous polygonal areas ranging in size from $\frac{1}{4}$ square inch to 1 square inch. The central part of each polygon protrudes about $\frac{1}{6}$ inch higher than its margin; and in the bulging inner part of each polygon a network of curved and irregularly branching crease lines can be observed radiating from the central part to the vicinity of the margin. Presumably the retracted polyzoa were folded up and hidden beneath these.

Along the crease lines on some of the specimens there were numerous, dark brown, flattened discs about $\frac{1}{30}$ inch in diameter. These became detached and sank as the colony was disturbed. These were the statoblasts or winter eggs. It is reported that when naturally detached from the colony late in the season they float.

A colony, 9 inches in diameter, was split in half by a thrust of the paddle and was found to consist, inside the enveloping skin, of colourless, almost transparent, jelly-like material. This

material occurs in closely packed polygonal prisms that radiate from the center and that become thicker toward the periphery. The widths of the prisms near the surface of the colony is commonly between $\frac{1}{2}$ and $\frac{3}{4}$ inch and the termination of each prism is defined by polygonal, protuberance visible on the outer surface. The prisms can not be readily detached from one another.

In some colonies the central part of the jelly-like mass was green as if an alga were growing in the jelly; and in some there was a red central part surrounded by a green zone, surrounded in turn by the clear, colourless jelly.

The colonies when dislodged from their support were observed to sink slowly; it was evident that their specific gravity was slightly greater than one.

The natural surface appearance and the method of attachment to a submerged twig is shown in the compound globular specimen at the left, the internal radiating structure in the jelly-like mass is shown in the section of the globular specimen at the right. The latter was 9 inches in diameter.

THRUSH SONGS

By W. E. SAUNDERS and F. P. LORD



SOME YEARS ago I learnt (so I thought) the song of the Gray-Cheek so well that I could always tell it, the difference being exactly as told to me by F. A. Saunders, and E. T. Seton, namely a vibrant buzzing quality which was lacking in the song of the Olive-back. But when I had a chance to test my newly acquired "knowledge" on the south shore of the St. Lawrence in July of 1933, I found at first that every thrush I heard had much vibrance, and when we looked up the singer, every one proved to be an Olive-back, so we concluded that we were hearing nothing else; then, when we were nearly at the end of our stay, a thrush flew out into the open, and to our dismay, it was a Gray-cheek. Its mate had been singing on one or two occasions and was written down as an Olive. So I have come to the definite and positive conclusion that in the present state of my education, I know nothing whatever of the differences between the songs of these two species, and with particular definiteness I am positive that no one can describe those differences to me with any real expectation that I shall identify them at the first hearing.

I have never heard any thrush that seemed to my ear to fulfil the statement of Dr. Lewis in a recent number of *The Naturalist* that each roll begins on the same note, but on the contrary, I do positively notice that neither of these thrushes has that habit. Now, one of us is mistaken and with my small experience it is more likely that it is I, yet my ideas may be worth publishing because they illustrate the difficulties of the situation. There is every probability that Dr. Lewis can distinguish the songs, and I have said that I cannot do so, but it is equally sure that his criteria are useless to me, and I make this statement chiefly because others may find the same trouble.

Now, with the Hermit, I find no such difficulty. His clear, flute-like tone is entirely different, and he usually commences with a very long note. Sometimes, as Dr. Lewis says, the trend of the song is downward, but I believe that the contrary is usually the case, and sometimes the song of this bird may be represented on our musical scale with almost perfect accuracy. Dr. Lewis says that "no two successive series of notes sung by this species begin on the same note" but I think he does not mean

just that, for very often the hermit will repeat the same song over and over, and in such a case, it naturally follows that the first notes of those songs are identical. I take it that he means to apply this reference to *different* songs and not to repetitions of a single song. I have submitted these notes to my brother, Dr. F. A. Saunders, and at this point he comments that he thinks Dr. Lewis is more nearly correct, but "both are wrong".

I must differ with Dr. Lewis again and very emphatically, when he says of the Gray-cheek series, in each of which at least "a part of the notes are often arranged in a descending order" and I think that there he is entirely wrong. The Hermit rarely travels down in his songs though this applies only when the whole song is considered; the Veery always travels down but the other two always go up. ("Not to me", says my brother). Dr. Lewis may be pardoned if he thinks that "always" is a strong word for me to use in view of my limited experience with some of these species, but, from the style of the songs, I am convinced that the statement is very nearly correct. I have found the Gray-cheek giving the exact song that has been described to me, namely, that of the Veery, only going up instead of down, but it must be remembered that the upward trend of the Gray-cheek refers to the average pitch of the sections of the song, each of which curves up, then down, but each of the three or four sections is pitched higher than the preceding one, so that the total effect is upward. There is the same character in the song of the Olive-back, but its range is much higher, and between these two songs I get lost in "no man's land", complicated as the matter usually is by the music of some abhorred little insects that often compel one to quit listening just when he wants to continue.

In conclusion, I would say that the Hermit, Wood and Veery are not easily confounded with one another, and are rather easy to separate from any other, but distinguishing the Olive-back and the Gray-cheek is another matter entirely. All of this may be just a testimony to my own density or ignorance, but probably others are in much the same box.

Dear Gordon:—

It was good of you to send me the letters from your brother, Miss Betty Smart and Dr. Harrison F. Lewis, all of which, you can well imagine, I read with great pleasure and interest. In regard to the thrush, let me say a few words, as I have been looking up my old notes in regard to his song especially.

When I was staying at the Parker House (now burned to the ground, I am told) in Benton, N.H., in the summer of 1913, I made a special trip to get acquainted with the Bicknell thrush, which I had read would be found on the higher levels of the White Mts. Why not on Moosilauke? I left the house before 2 A.M., by moonlight for a short time, then in the darkness until the daylight of June 18 began to give me aid and reached the top before 4 A.M., in time, I recall with a thrill to this day, to see the sun rise and stand poised for a minute on the very top of Mt. Washington.

On that trip I first saw, so as to identify it, the Bicknell thrush, getting good views up to twenty-five feet and less distant, with my field glasses. I also learned the song and call-notes, which were new to me, and which I could then well compare with those of the previously learned Olive-backed thrush. If I may quote from my notes, made at the time, it struck me as follows: "Song is perhaps most like Olive-backed in quality (suggests also Veery). It begins high and slides down, in notes, unmistakably thrush's. Sometimes I could hear a preliminary three to six unmusical, cackling notes, then song. Some were short as given below, others longer, but very similar in scheme to the short one; seemed to cover whole octave or more. All ended with a slide (glissando) *up* to dominant note. Did not carry very far."



This, I labelled, the simplest type of song. You will notice that the pitch was an octave higher than written.

The call note a slurred whistle, with accent on the first note.

A similar call-note was an octave higher than this, and much louder, a sort of piercing, clear scream. It always had two tones, never like that of the Olive-backed thrush. Then follows a description of coloration, field-marks and size, which fits in well with the text-book descriptions.



Two days before I had made a notation on the Olive-backed thrush, which bears on the general subject of these birds. "This bird has a call-note, a single short whistle (F or G in the top octave) (very bell-like, but muted).

He seemed to say (and this impression remains to this day, though nothing like the note of the bird it brings to a reader's mind)

"Whip-poor-will-ee-will-ee-".



Read an octave higher.

Many times since have I heard the Bicknell on Moosilauke and others of the White Mts., and there is no other song or call quite like it. The song of the Bicknell, as all the evidence you send me attests, I also heard as a descent, except for the final rise from the grace note to the last note. Perhaps, as some say, its quality is more like the Veery's than the Olive-backed, but it has not (?) anything of the so-called "beaded" effect, so marked in the Veery, though both descend. It is more like the Olive-backed thrush's quality, as I recall it, but not an ascent, like his. The call-note of the Bicknell is much like that of the Veery, but much higher pitched, I think. It was very-interesting near the 3000 foot level, below which the Bicknell did not seem to be found, but above which the Olive-backed was occasionally found, to hear the two birds

both within singing distance, giving their characteristic song and call. I remember, apropos of this overlapping of territory, hearing near but below the 3000 foot level, on both Moosilauke and Mansfield, later, the songs of the Olive-backed, Veery, Hermit and Wood thrush, with perhaps the Bicknell's left a few hundred feet farther up the mountain. One could add the bluebird and robin, and get the whole group almost within hearing distance of a single spot.

The thrushes I saw in the Gaspé, and which I spoke of as Bicknell thrushes might have been the Gray-cheeked for aught I know from my careless observation. I do not know whether the Gray-cheeked's song is the same as that of the Bicknell or not, having supposed they were alike, perhaps for no good reason.

Since those days I have scrambled amongst the scrub of the mountain tops to find a Bicknell's nest, but never successfully. For some reason they are the most wary fellows, who have no need to be in their chosen habitat. It is my ambition yet to find one, not to rob it, however. I should like a photograph of one at its nest.

I notice Forbush gives the Gray-cheeked's song as "not noticeably different from that of the Bicknell's thrush". His descriptions of the Bicknell's thrush's song are not to my liking as I have heard it.

In May, 1913, Mr. Henry Oldys and I took a walk near Pompanoosuc, Vt., and there heard a remarkable Hermit thrush song, "the most interesting bird-song I have heard in ten years", says Mr. Oldys, and later he published it in *The Auk*. Here is a copy of his rendition of that song:



The enclosure sent with this letter may interest you. The book is a joy, and I can only give a few quotations for your pleasure. The second is entitled, "The First Library Mention of Halitosis". The table of values, æsthetic, of certain English bird-songs, reminds me of many of the scientific (sic!) evaluations which you must have had as Dean of Freshmen of the candidates for Darmouth College. The more scientific one is, the stranger often the results. It seems to work like a cumulative error in a mathematical

problem. When I see the thrush and blackbird placed at the bottom of the list of English avian musicians I marvel at the difficulties of "pondering the imponderable". I rate the blackbird at the top of the list, and wonder whether the atmosphere and aura that surround the hermit thrush is why I prefer him to even the English blackbird.

This is already too much — and I had hardly begun. I spare your more. — FRED P. LORD.

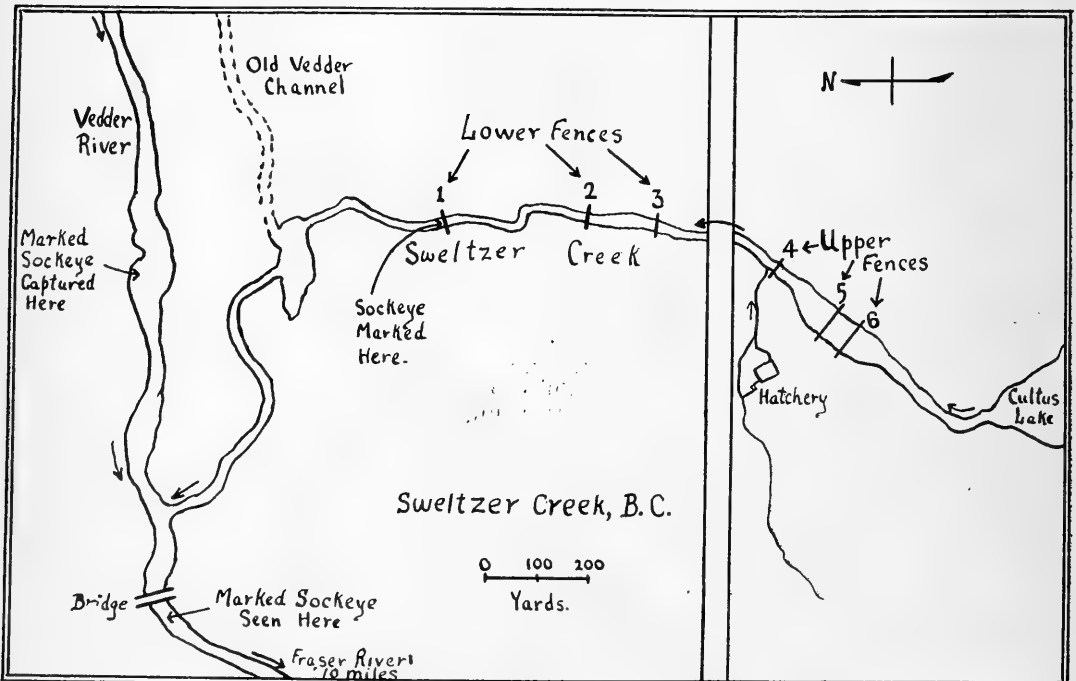
OBSERVATIONS ON THE BEHAVIOUR OF ADULT SOCKEYE SALMON DURING THE SPAWNING MIGRATION.

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THE OUTLET of Cultus Lake, British Columbia, is Sweltzer Creek, which leaves the northern end of the lake and flows for about two miles before it empties into the Vedder River, a tributary of the Fraser. The Vedder is at least ten times the volume of Sweltzer Creek, and daily temperature readings made in the fall of 1934

show that it is consistently the colder of the two. Artificial propagation of Sockeye Salmon [*Oncorhynchus nerka*] is carried on in this locality, and six weirs or wooden fences have been constructed in Sweltzer Creek to facilitate spawning operations. This series of structures may be divided into a lower group, numbered 1 to 3, of which the lowest (No. 1) lies 1050



yards from the Vedder, and an upper group near the lake, numbered 4 to 6.

Each autumn a greater or lesser number of sockeye ascend Sweltzer Creek on their way to spawn in Cultus Lake and its tributary streams; in 1934 there were about 20,000, all told. These must all enter the traps in fence 1, from which they are dipped and placed on the upstream side to proceed on their way. For several years it has been the observation of the watchmen stationed at fence 1 that on many nights large numbers of sockeye would crowd along the fence, yet by morning only a few would have entered the traps, or be visible in the creek. This suggestion of downstream wandering becomes significant in the light of the experiment described below.

During the dry weather of early October, 1934, the time at which the salmon run was beginning in the creek, several hundred sockeye were observed resting in the Vedder River just below the mouth of Sweltzer. On October 11, between 50 and 100 were seen in a pool of the Vedder 450 yards *above* the mouth of the creek, and a school whose estimated number varied from 25 to 250 remained in the same place until at least October 19. After that date high water made further observations impossible.

Since the run of sockeye to the upper Vedder River usually occurs earlier in the summer, the possibility was suggested that these were fish which had endeavoured to ascend Sweltzer Creek, but finding the fence an obstacle to their progress, has dropped back to the Vedder and gone up it to where they were now seen. Furthermore it was not unreasonable to suppose that some of them might never reach their original goal, but might go on up the Vedder instead. To establish the identity of the resting fish was therefore a question of considerable interest.

To this end 50 sockeye taken from the traps of fence 1 were marked by removal of the outer half of the dorsal fin, on October 11, and placed *below* the fence. A similar number was treated in the same manner on October 15. As a check on the behaviour of these experimental fish, a gill net was set in the Vedder pool where sockeye had previously been seen. From October 11 to 16, during which time the net was in constant operation, 4 unmarked and 1 marked male sockeye were captured. Through the co-operation of Fisheries Inspector W. J. Barker another net was set about a mile and a half farther up stream. No sockeye were captured in it.

In addition to the information provided by these nets, it was possible to make direct observations. At least one male and one female whose dorsal fins had been clipped were observed in the Vedder above its confluence with Sweltzer Creek, from October 16 to 18. On October 18 ten marked males were seen in the Vedder below the junction.

It was therefore well established that these marked sockeye had returned downstream after being liberated from the traps for more than half a mile to the Vedder River, and that some of them had ascended the latter stream to a distance of a quarter of a mile above the union. Their subsequent movements were not fully known until two months later.

Since in 1934 the sockeye running to Cultus Lake were retained for use in artificial propagation, a careful examination could be made of all of them. Those which died in the creek, as well as those which were actually stripped, were salvaged, and their fins inspected. As is evident from the table, all of 100 sockeye marked and liberated below fence 1 were recovered in Sweltzer Creek, with the exception of the one netted in the Vedder. After leaving the "parent" stream for another, the entire lot had sooner or later returned to it. None stayed in the Vedder permanently.

Regarding the time which the marked fish spent in the river before returning to Sweltzer Creek, it is possible to make only approximate calculations. On the day immediately following the first marking, 6 re-entered fence 1 traps; 9 of the second lot did likewise. Close watch was kept for 5 days thereafter, but no more appeared. Unfortunately it then became impossible to examine all sockeye dipped over this weir, but a few marked males were noticed, from October 21 to November 1. It seems probable that most of the marked fish passed through during that interval. In any case, 77 males and 8 females had gone up before November 5, because they had passed through fence 3 before its closure on that date.

The "parent stream" theory of salmon migration postulates that on returning from the sea, the adult fish ascend the same river and the same tributaries as they traversed as young on their seaward migration a few years previously. The egg-measuring study of Robertson (1921), and the marking experiments of Foerster (1934), leave no doubt as to the general applicability of this theory to the case of the Fraser River sockeye, though it is not yet known what influence guide the fish to their native

waters. It is possible, though not easy, to imagine a salmon, on arriving at the junction of two rivers, recognizing the native stream by some physical or chemical characteristic to which it is conditioned. It is much less easy to picture a salmon, hauled in its attempt to ascend this "parent" stream, descending to an alternative one and proceeding up it for a quarter of a mile; then, though no barrier stands in its way, refusing to go farther, and returning once again toward its early haunts. Yet any complete theory of the mechanics of migration must account for this phenomenon.

SUMMARY

1. Migrating adult sockeye salmon, meeting an obstacle in the "parent" stream, returned downstream to a larger river, and some of

them ascended this larger river for a considerable distance.

2. Of an experimentally marked group of 100 such salmon, all eventually returned to the parent stream again, after a period of absence lasting up to three weeks.

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Date		Number Fence	Mkd 1 ♀	Counted Fence	1 through Traps	Recovered Fences	1 to 3 ♀	Recovered Fences	4 to 6 ♀
		♂	♀	♂	♀	♂	♀	♂	♀
Oct.	11	44	6						
	12	—	—	5	1				
	15	39	11	—	—				
	16	—	—	8	1				
	21	—	—	4	—				
	22	—	—	3	—				
	25	—	—	2	—				
Nov.	1	—	—	1	—				
	6	—	—	1	—				
	9	—	—	—	—	—	—	—	1
	13	—	—	—	—	—	—	—	1
	14	—	—	—	—	—	—	5	—
	18	—	—	—	—	—	1	1	—
	19	—	—	—	—	—	—	4	—
	20	—	—	—	—	—	—	1	2
	21	—	—	—	—	—	—	4	1
	22	—	—	—	—	—	1	1	—
	23	—	—	—	—	—	—	2	2
	24	—	—	—	—	—	—	5	1
	25	—	—	—	—	—	—	3	—
	26	—	—	—	—	—	1	6	1
	27	—	—	—	—	—	—	6	—
	28	—	—	—	—	—	—	3	—
	Dec.	29	—	—	—	—	—	—	3
30		—	—	—	—	—	—	4	—
1		—	—	—	—	1	2	7	—
2		—	—	—	—	—	1	4	—
3		—	—	—	—	1	—	5	—
4		—	—	—	—	—	—	2	—
5		—	—	—	—	3	2	3*	—
7		—	—	—	—	—	—	2	—
8		—	—	—	—	—	—	3	—
12		—	—	—	—	—	—	1	—
14		—	—	—	—	—	—	1	—
17		—	—	—	—	—	—	1	—
19		—	—	—	—	—	—	1	—
Totals		83	17	24	2	5	8	78*	9

*One of these had the dorsal stump much frayed, hence was rather doubtful as a mark. In addition to the above recoveries, one male was taken in a gill-net in the Vedder River. Total males marked: 83. Recovered: 83 plus one doubtful. Total females marked: 17. Recovered: 17.

TROUT FINGERLINGS KILLED BY NATURAL FISHHOOKS OR SPEARS: THE SEEDS OF BIDENS

By A. G. HUNTSMAN



IN DECEMBER of 1933, Mr. J. A. Rodd, Director of Fish Culture, sent me specimens of trout fingerlings, which had been killed by the barbed seeds of "wild sunflower." The matter was being given some publicity in the *Fisheries News Bulletin* (1933). These trout were being reared in a small stream near Sardis, British Columbia, by Edwin A. Wells and Sons, when their death occurred from this cause. Mr. Oliver Wells furnished me with the following information:

"Early in April I scraped out a long pond in a little side stream of the creek which flows through our farm. This pond is about 125 ft. long, 8 to 12 ft. wide and from 6 in. at head to 2 ft. deep at lower end. The native weeds and grasses grew up around the pond and among them grew a weed, said to be the wild sunflower. During the summer it made shade for the pond and with its heavy green foliage and large yellow flowers made quite an acceptable plant for the pond. I believe it blooms in August and September, and the seeds likely fall from October 1st till perhaps the middle of November here in British Columbia.

"The seeds fall into the water separately or several in a clump and are picked up around the pond edge by the feeding fingerlings. Of 1,000 of these about 120 picked up the seeds of the sunflower and died; so that from 10 to 12% of the fry in a pond around which only a few of the plants were growing were killed by the seeds of the sunflower. The young fish apparently mistake the seed for an insect and strike at it. The seed has four little barbs at one end which cling to whatever they touch. I have caught some of the fry while they were quite lively and trying to feed with the seed attached to them, and found if I tried to pull the seed off it brought the flesh and all with it.

"Young fingerling from 1½ in. up to 3 in. in length seem to be likely to be killed by this sunflower seed. I have found a few salmon fry in natural waters killed when they are about 3 in. in length. If the seed is not attached to the head it may be stuck in the throat of the fish."

The seeds have been identified by Dr. H. B. Sifton of the University of Toronto as those

of a bur marigold, probably *Bidens cernua*, the "sticktight."

As to the fingerlings mentioned by Mr. Wells, Mr. Rodd informs me that he was sent Cranbrook cutthroat trout (presumably *Salmo clarkii lewisi*) hatched at the Cultus Lake hatchery. The smallest fingerling (32 mm. long) has the awns of a seed embedded in the upper jaw on the right side, the remainder of the seed projecting forward and to the right. The fungus has overgrown an area extending outward from the points of entrance of the awns and involving part of the right eye. The next fingerling is 35 mm. long and has a seed extending from the under surface of the right half of the lower jaw downwards and slightly outwards and backwards. The awns has passed through the lower jaw so that their tips had entered the upper jaw and thus closed the mouth. The head is extensively involved with the fungus. The largest fish is 45 mm. long, and has three seeds radiating in a horizontal plane from a point between and in front of the eyes. The awns of the three seeds are interlocked and in part penetrate the skin of the fish, but there is no fungus in evidence.

Gudger (1931) reports and figures a 33cm. long rainbow trout with a "horn" sticking up from the top of its head, obtained from a trout hatchery in North Carolina. On careful examination the "horn" proved to be a seed of *Bidens cernua* and fungus was growing around the site of attachment, this being considered responsible for the death of the fish. He also states that the seeds of "sticktight" are, in the experience of Dr. F. E. Lutz, responsible, by becoming attached to their heads, for the death of aquarial fishes, when accidentally introduced into aquaria at Ramsey, New Jersey.

Lorenz (1880), as related by Gudger, described how the seeds of *Bidens cernua* var. *radiata* are injurious to pond fishes, by being carried by breathing movements into the smelling, feeding and breathing mechanisms of the fishes, and causing death by producing fungus-covered sores and preventing feeding.

It seems clear from the case described and figured by Gudger that death results from the growth of fungus (*Achyla* or *Saprolegnia*) in the tissues of the head of the fish, starting from the wounds made by the penetration of

the barbed awns of the seed. The position of the seed was such as not to interfere with either feeding or breathing.

How do the seeds reach the fish? Lorenz' account, as translated by Gudger, is that "through the breathing movements of the fishes the seed pods are disturbed so that they desert their radiate container and, vampire-like, sink their bearded points into the mouth and food openings of the fishes." Gudger theorizes that "the trout-let swimming around in the tank, no doubt stuck its head against the tip of the seed pod and the recurved hooks fastened themselves in the tender skin."

I asked Mr. Wells to make further observations during another season and he has written me under date of October 28, 1934, as follows:

"This summer I was watching for the plant and found little sign of it until it came into bloom in the month of September. At this time the weed was springing up into bloom all around my trout ponds. Seeds form and ripen and drop during October and for some time following.

"When the plant was blooming I kept pulling any that grew along the pond edges and have had no loss of trout fingerlings in the ponds this year.

"I scattered a few seeds of this weed on the water of a trough in which I have about 100 late fingerlings (1¾ in. long). Almost immediately two of the fish struck at seeds and were caught by the burr clinging to the nose

and upper jaw. The burrs are clinging there still and remain until the fish dies of starvation or fungus setting in."

These very precise observations demonstrate clearly that the fish strikes at the seed as food and impales itself on the awns. The seed of the bur marigold, sticktight, beggar tick, or wild sunflower, as it is variously named, is truly a natural fish hook, although the awns of the seed with their many backwardly directed barbs might more appropriately be called minute spears. The young fish take the seed in the same way that large trout and salmon take the artificial dry fly, so much used by anglers. It should be noted that Mr. Wel's considers that these seeds are taken only by fish of a certain size, namely from 1¼ to 3 inches in length.

The conclusion of Lorenz can scarcely be improved. "In the light of this knowledge, the extermination of *Bidens cernua* is to be recommended to every fish culturist or pond owner."

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A BADGER SPECIMEN FROM PORT DOVER, NORFOLK COUNTY, ONTARIO

By L. L. SNYDER



NEWS ITEM in the local press of Toronto for November 24, 1934, gave an account of the capture of a badger [*Taridea taxus*] near Port Dover, Ontario. The writer immediately communicated with a naturalist of the region, Mr. Munroe Landon, of Simcoe, Ontario, who replied that the report was correct and gave further details. He was unable to find that anyone in the region had kept a captive specimen. A complete account of the capture has been related by Mr. William Pursley who had secured the animal and has forwarded the pelt to the Royal Ontario Museum of Zoology, Toronto. Mr. Pursley writes,

"I caught him on November 5th, 1934, on my farm about three miles west of Port Dover along the fence in an open field about one half-mile away from any woods. While ploughing I noticed my dog along the fence and thought he had something. The badger had been digging in a groundhog's hole and the dog was worrying him so that he could not dig. I struck the animal with a club and the one blow killed him. I did not weigh him but I thought he would weigh between forty-five and fifty pounds as he was very fat."

In the *Journal of Mammalogy* for May, 1934, E. L. Moseley gives an account of the "Increase of Badgers in Northwestern Ohio". He states

that "I now have data for nearly seventy badgers caught or killed in ten counties of northwestern Ohio. About half of these badgers were found in the last six years". A letter from Dr. Lee R. Dice, Curator of Mammals, University of Michigan, states that "According to Mr. N. A. Wood, a few badgers were found in southern Michigan when the first settlers arrived here over a hundred years ago. At the present time badgers are thinly distributed over the whole state. They probably have increased somewhat since the clearing of the forest. They occur not only in open fields, but also in open stands of timber".

Saunders (*Trans. Royal Can. Inst. Vol. 18, Part 2, p. 286*) has recorded an Ontario specimen of badger taken at Grand Bend, Ontario, late in the 1890's. This record indicates the early presence of the species in southern Ontario and suggests the possibility that badgers may have persisted in this part of the province. If this seems unlikely in view of the complete settlement of the region and the absence of reports, there is still another possibility. The information given in the foregoing paragraph which relates to Ohio and Michigan suggests that these areas are possible sources of the recent badger specimen.

GREAT MIGRATION OF SNOW GEESE IN THE NEIGHBOURHOOD OF MEAFORD, ONTARIO

By L. H. BEAMER, Meaford, Ontario



BOTH SNOW GEESE [*Chen hyperborea*] and Blue Geese [*Chen caerulescens*] have been seen several times near Meaford and Owen Sound in recent years, so that members of the Meaford Natural History Club were not surprised to learn that white geese had been seen on October 16 near the Clay Banks which are about three miles south-east of the town along the shore. This flock numbered about one hundred and included about thirty white geese.

This flock or one like it stayed in the neighbourhood till October 27. On this Saturday a gale blew from the North and continued for two days but decreased in intensity. After 11 o'clock at night large flocks of geese were heard over the town, some settling in the harbour and others passing over the town towards the interior.

On Sunday morning hundreds of these geese were seen along the Clay Banks resting on the land. From the description these flocks included both Blue and Snow Geese and numbered hundreds, possibly over a thousand. On the evening of the same day, hundreds of geese settled on the river at Walter's Falls.

On Monday the height of the migration was

reached. Flocks varying from a single stray goose to one of five hundred were seen. These almost invariably flew towards the South or South-east.

Whenever the flocks flew low enough or the sun shone on them at the proper angle, the pure white individuals could be seen. These constituted anywhere from 25% of the flock to 100% of it.

In all about six thousand geese were seen, the majority of these being white.

From October 28th till November 1st other flocks were noted. On the latter date, a flock of one hundred white geese was seen at the Clay Banks.

The above observations were made by a number of people of the town of Meaford, who are interested in natural history. Many of them are hunters of considerable experience, who have seen both Blue or Snow Geese before. This year we have the skin of a splendid Snow Goose to add to the High School collection, while the Royal Ontario Museum has the wings, head and feet of a Blue Goose, as souvenirs of this migration.

FURTHER ADDITIONS TO THE VASCULAR PLANTS OF ANTICOSTI ISLAND¹

By J. ADAMS



IN A PREVIOUS list of species not recorded hitherto as occurring in Anticosti Island and published in *The Canadian Field-Naturalist* for April, 1934, one species, namely *Ammophila arenaria* Link, was mentioned in error. This should have been *Elymus mollis* Trin. already known from Schmitt's *Monographie* as being present on the island. While the American variety *breviligulata* Fernald of *Ammophila arenaria* has been found in several localities on the north shore, such as Mingan and Natashkwan, there is no authentic record so far of its occurrence on Anticosti Island.

My visit during 1934 extended from 25th August to 7th September. All the plants mentioned in the present list—36 in number—were found in the west end of the island between Baie Ste. Claire and Lake Simonne. The sequence of families follows that in Schmitt's *Monographie*, the introduced species having an asterisk prefixed.

LYCOPODIACEAE

Lycopodium obscurum L. Along logging railway.

NATADACEAE

Najas flexilis Rost. et Schmidt. Lake Simonne.

POTAMOGETONACEAE

Potamogeton interior Rydb. Vicinity of Ellis Bay.

P. lucens L. Lake Simonne.

GRAMINEAE

**Poa compressa* L. Vicinity of Ellis Bay.

CYPERACEAE

Carex arctata Boott.

C. Crawfordii Fernald.

C. exilis Dewey.

C. paupercula Michx.

C. rhomalea Mackenzie

C. tribuloides Wahl.

C. trisperma Dewey

C. vulpinoidea Michx.

The above species of *Carex* were obtained in the neighbourhood of Ellis Bay.

Scirpus paludosus A. Nelson. On salt marsh, Ellis Bay.

JUNCACEAE

Juncus filiformis L. Vicinity of Ellis Bay.

Luzula campestris DC. Vicinity of Ellis Bay.

ORCHIDACEAE

Corallorhiza trifida Chatelain. Vicinity of Ellis Bay.

POLYGONACEAE

**Rumex Patientia* L. Ellis Bay.

CARYOPHYLLACEAE

Cerastium arvense L. Anse aux Fraises.

**Silene noctiflora* L. Ellis Bay. Only one specimen seen.

RANUNCULACEAE

Ranunculus Purshii Richards. Near Ellis Bay.

Thalictrum polygamum Muhl. Ellis Bay.

CRUCIFERAE

**Neslia paniculata* Desv. Ellis Bay. Only one specimen seen.

Sisymbrium Hartwegianum Fourn. Garden at Port Menier. Only one specimen seen.

BALSAMINACEAE

Impatiens biflora Walt. Vicinity of Ellis Bay.

LYTHRACEAE

**Lythrum Salicaria* L. Edge of Lake St. George.

LEGUMINOSAE

**Vicia hirsuta* Koch. On wharf, Port Menier.

LENTIBULARIACEAE

Utricularia minor L. Vicinity of Ellis Bay.

RUBIACEAE

Galium palustre L. Ellis Bay.

**G. verum* L. In field near Chateau Menier.

COMPOSITAE

**Centaurea nigra* L. In field near Chateau Menier.

**Cirsium lanceolatum* Hill. Ellis Bay vicinity.

Gnaphalium silvaticum L. Along logging railway.

Hieracium canadense Michx. Ellis Bay.

**H. pratense* Tausch. Along logging railway.
Senecio pauperculus Michx. Marsh near Chateau Menier

In addition to the above a species of grass was collected a little above high water mark at Ellis Bay close to the Chateau Menier. In

¹Contribution No. 431 from the Division of Botany, Experimental Farms Branch, Department of Agriculture, Ottawa.

appearance it resembled *Elymus mollis* Trin. being about 3 feet high, robust, and glaucous. But the spikelets all occurred singly, in this respect resembling the condition found in *Agropyrum*. A specimen was submitted to Dr. A. S. Hitchcock, the eminent Agrostologist of the Bureau of Plant Industry at Washington, D.C.,

who reported concerning it: "This specimen is different from anything that I have seen. I am unable to place it with any species known." The presumption at present is that it is a hybrid between *Elymus* and *Agropyrum* but further investigation will be necessary to determine its exact status.

JOHN TOWNSON

May 13, 1856 — October 9, 1934

On October 9, 1934, John Townson, a well-known naturalist-sportsman of Toronto, died suddenly while proceeding to his shooting blind at Weller's Bay, Prince Edward County, Ontario. Mr. Townson was born at Carlisle, England, on May 13, 1856. At the age of three he came to Canada with his parents who established residence in Toronto.

John Townson represented that admirable group of sportsmen who are primarily naturalists and secondarily marksmen. His bag was frequently divided between scientific collections and the tables of his many friends. He was familiar with such shooting stations as Long Point (Norfolk County), Weller's Bay, St. Clair Flats, and Conroy's Marsh (Halton County), in Ontario. His proficiency in identifying waterfowl and shorebirds was widely recognized and his interesting accounts of the ways of birds in general

appeared regularly for upwards of fifteen years in the *Toronto Globe*. He also contributed articles to *Rod and Gun* which are dependable records of observations. His only contribution to *The Canadian Field-Naturalist* concerned the nesting of the Lesser Scaup Duck at Toronto, (Vol. 44: 167, 1930).

Mr. Townson's memory for incidents and information concerning the Toronto region, covering a period of more than three score years, was most remarkable. As a member of the Brodie Club he formed a valuable link between the past and present in our rapidly changing environment. His passing, at the age of seventy-eight, takes from Toronto natural history circles a most useful life and an admirable individual who enjoyed the wide range of human activities from the sportive to the serious.—L.L.S.

NOTES AND OBSERVATIONS

WHITE TIPS OF *Napaeozapus* TAILS.—That the amount of white tip on the tail of *Napaeozapus* was far from constant was apparent to me from my first acquaintance with this species. Recently, while showing my collection to some friends, I laid a series of nine *Napaeozapus* on the table, arranged in order of the amount of white on the tips of their tails. Two distinct groups were apparent, one with only a small amount of white, the other with a considerably larger amount. The former group consisted entirely of females, the latter of males. When specimens from other collections were compared with mine, this grouping was broken up, but the data still show a slight sex differ-

entiation with respect to the extent of the white tip. Since the tip of the tail is so often torn in wiring, it is suggested that an additional measurement "White Tip of Tail" should be taken before skinning specimens of *Napaeozapus*.—C.H.D. CLARKE, *University of Toronto*.

UNUSUAL NESTING OF EASTERN REDWING (*Agelaius phoeniceus phoeniceus*) AT TORONTO.—Two unusually situated nests of the Eastern Redwing were found by the writer in the Humber marshes at Toronto on June 25, 1934. Both were in willows bordering the marsh, one eight feet up, the other eleven feet and they contained

partially incubated eggs. No explanation can be offered for such unusual nesting as plenty of sites were available in the rushes and a number of nests were found there.—C. E. HOPE, *Royal Ontario Museum of Zoology*.

CROSSBILLS AND STARLINGS.—On August 31st, 1934, I had the pleasure of spending a very profitable day with that enthusiastic naturalist, Mr. Kay, of Port Sydney, Muskoka District, Ontario. During our general conversation he observed that the White-winged Crossbills, formerly abundant in the Macy Lake district, were now but occasionally seen. Moreover, their disappearance had coincided with the early occurrence of large flocks of Starlings in the area, several years ago. He correlated the two facts on the grounds that the Crossbills formerly fed extensively on the seeds of the Elm. Now the Starlings consume the seeds and none are left for the northern visitors. Just another link in the chain of evidence which has piled up against the introduction of foreign species.—A. E. ALLIN, M.D., *Toronto*.

RED-BREASTED NUTHATCH (*Sitta canadensis*).—In the March, 1935, issue of *The Canadian Field-Naturalist* I saw F. L. Farley's report of the Red-breasted Nuthatch having wintered at Camrose, Alberta. Last autumn three of these birds came to my feeding place and two have been fed all through the winter with other birds. During our very severe month (parts of December and January) I felt a bit anxious about them, but they came through in good condition and are still feeding daily (March, 1935). They are very tame and come close to my hands when I am putting out fresh food, "talking" to me all the time.—ELSIE CASSELS, *Red Deer, Alberta*.

FOX SPARROW WINTERING AT TORONTO.—In view of the scarcity of published winter records for this species the following occurrence may be worth reporting.

A single bird spent the winter of 1922-23 in and around a garden in North Toronto and was seen on numerous occasions from December 11th to March 25th. It appeared to be normal in every way and survived in spite of fairly deep snow through most of January and February.—R. D. USSHER, *King, Ontario*.

GERMAN BIRD BANDS.—The German Ambassador has officially advised the Government of Canada through the Honourable Mr. J. H. Thomas, Secretary of State for Dominion Affairs, that official bird bands or rings used by two German bird observatories in studying the movements and life histories of wild birds bear, in addition to a serial number, the following inscription:—

"Vogelwarte Helgoland", or "Vogelwarte Rositten".

The words "Germania" "retour" or "urgent" are also sometimes inscribed on the bands.

Should any person in Canada take a bird wearing a band from either one of the two German bird-banding stations, it would be very much appreciated if they would report the facts to the Commissioner, National Parks of Canada, Ottawa, who has custody of the official bird-banding records for Canada.

Reports concerning wild birds wearing bands of any kind are very much appreciated by the National Parks Service of Canada since every banded bird reported helps to add to the store of valuable scientific data being collected by the banding method. Bird banding in North America is an international investigation of the general life histories of native wild birds and is being conducted in full co-operation between the Canadian and United States Governments which have the assistance of hundreds of voluntary co-operators throughout Canada and the United States in conducting this valuable work. Reports concerning bird bands, if mailed in Canada, may be forwarded postage free if enclosed in envelopes marked "O.H.M.S." and addressed to The Commissioner, National Parks of Canada, Ottawa.

REVIEWS

Contributions from the Arnold Arboretum of Harvard University, No. VI Phytogeographic Studies in the Peace and Upper Liard River Regions, Canada. With a Catalogue of the Vascular Plants. By Hugh M. Raup.

Pp. 1-230, Plates 1-9, map. February 15, 1934. \$2.50.

This work contains an interesting historical description of the exploration of the region followed by an account of the Geology, Physio-

graphy, and Climate. Forty-five pages are devoted to an ecological survey of the vegetation while the detailed list of species and their distribution covers rather more than 100 pages.

Altogether 754 species are enumerated of which five are new. These are *Antennaria atriceps*, *A. megacepha'la*, *Braya Henryae*, *Draba longipes*, and *Salié fal'ax* all of which are illustrated by photographs.

Potter, David.—*Plants collected in the southern region of James Bay. Rhodora*, vol. 36, pp. 274-284, map, August, 1934.

The area covered extends from Moose River in Ontario to Eastmain River in Quebec and also includes Charlton Island. Altogether 340 species and varieties of vascular plants are enumerated arranged under their respective families. For purposes of distribution the area investigated was divided by the author into eight separate districts.

Newton, D. E. & Stobbe, P.C.—*The relation of flora to soil types in the counties of Chateauguay, Huntingdon and Argenteuil in Quebec. Pasture studies V. Macdonald College Technical Bulletin No. 14, 47 pages, map and 8 figures. August, 1934.*

The distribution of 336 species of the higher plants, including ferns and lycopods, in relation to the various soil types considered in the above area is indicated in a special table.

Zenkert, Charles A.—*The Flora of the Niagara Frontier Region. Bulletin of the Buffalo Society of Natural Sciences, volume 16. x+328 pages, 77 illustrations and map, Buffalo, 1934. Price \$2.*

This volume which is neatly bound and printed on good paper opens with a brief description of previous exploration dating from the visit of Peter Kalin to Niagara Falls in 1750. The next section deals with the topography, geology and climate of the region which in addition to a large part of the State of New York includes also the Niagara Peninsula of Ontario. The greater part of the book, namely, about 200 pages, is devoted to the detailed distribution of the plants enumerated numbering altogether 1702 species and varieties.

The illustrations consist for the most part of photographs of plants growing in their natural habitats which have been reproduced very success-

fully. The last part of the book deals with plant societies, the final illustration giving a view "in the Garden of God, Point Abino, Ontario."—J. A.

The Amphibian Fauna from the South Joggins, Nova Scotia. By Margaret C. Steen, Ph. D. Proc. Zool. Soc. London, part 3, pp. 465-504, 5 plates, 1934.

"The first discovery of an Amphibian fauna in the great fossil trees at Coal Mine Point, South Joggins, Nova Scotia, was made by Lyell and Dawson in 1852. These few fragmentary fossil vertebrate bones were, with the exception of the single specimen of *Baphetes planiceps* from the Albion Mines, Pictou, found by Dawson in 1850, the first discovered remains of a Carboniferous land or semi-land fauna, and the great interest which they attracted resulted in a periodic investigation of the South Joggins locality for over forty years." Thus Dr. Steen begins her revision of the amphibia concerned.

The first description of these amphibian remains was made by Owen in 1853. In a long series of papers, published from 1853 to 1896, Dawson supplemented Owen's initial effort by his own observations. The field never seemed to lose its appeal for him and some of his most charming pieces of writing are concerned with these fossils. On page 148 of *The Story of the Earth and Man* (1873) he gives in delightful phrases his verbal reconstruction of one of these amphibia, a page deserving to be read by all who enjoy the literature of Geology at its best. In *Some Salient Points in the Science of the Earth*, Chapter 10, he gives the principal points regarding the history of the discoveries and much else of interest besides. In the eighty years since their discovery and the forty, since Dawson's last publication, our knowledge of the taxonomy of the group to which these amphibia belong has improved considerably, and it was with the intention of applying this newer knowledge that Professor D. M. S. Watson of the University of London requested the loan of our Joggins tree trunk material. To this we gladly acceded, and the work in London was prosecuted by Dr. Steen, the results of whose revision of this fauna are now before us.

It might be noted that little, if any, of this material exists outside of the collections in the Redpath Museum, McGill University, and the British Museum of Natural History, and that all of the material in those two Museums was collected by Dawson. No collecting for this

specific purpose, apparently, has been pursued for a half a century. The rapid erosion along the South Joggins cliffs has doubtless exposed new tree-trunks, from which additional material, possibly new, may await the specialist.

Modern critical examination, in the light of the present state of our knowledge, has shown that many of the species erected by Dawson are not acceptable, for as Dr. Steen says, "The validity of species, based on such characters as relative size, shape and size of teeth, number of dentary teeth, etc. is, in a fauna where all growth-stages are potentially present, questionable." Dawson's *Dendrerpeton oweni* now becomes a synonym for *D. acadianum* Owen. Eight other species are called "indeterminate" by Dr. Steen. These are in some cases obviously valid, but even so they add very little to our knowledge of the fauna and, as *species*, might very profitably be dropped from the list. Dawson's enthusiasm for his remarkable discoveries led him into paths which today we can hardly tread. Miss Steen leaves us five of the original species, the initial one by Owen and four by Dawson. These are

Dendrerpeton acadianum Owen (includes *D. oweni* Dawson)

Platystegos loricatum Dawson
Hylonomus lyelli Dawson
"Hylonomus" latidens Dawson
Fritschia curtidentata (Dawson)

In addition, Dr. Steen has determined five new genera of known affinities, and two of whose precise relationships she is uncertain. All in all the interpretation of this fauna now rests upon as scientifically secure a foundation as possible.

Dr. Steen's report is free from unwarranted restorations. Disregarding the tenuity of the evidence upon which such things may be based, they are invariably interesting, and therefore are sometimes too freely indulged in by authors to whom the effect of such cynosures appeals more than it should. Abundant cuts illustrate most of the known features of the species described. Owing to the generally unsatisfactory preservation and completeness of the actual specimens it is inadvisable to rely very much upon photographs. Nevertheless Dr. Steen gives us fourteen such reproductions, and it is a matter of considerable satisfaction to us at McGill University to see that of that number eight are photographs of specimens from the Redpath Museum. —T. H. CLARK, *Curator, Redpath Museum.*

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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HYDROIDS FROM THE WEST COAST OF VANCOUVER ISLAND

By C. McLEAN FRASER

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HERE HAS been comparatively little collecting of marine material from the west coast of Vancouver Island, although there is every indication that along some parts of the coast, at least, the fauna is quite rich. Only 43 species of hydroids have been reported.

During the summer of 1934, through an arrangement made between the Biological Board of Canada and the Hydrographic Survey, two representatives of the Pacific Biological Station at Nanaimo, Mr. J. P. Tully and Mr. E. G. Hart, were accommodated on the Survey Vessel, the *Wm. J. Stewart*, to carry on biological and physico-chemical investigations. The collection of the marine biological material was made by Mr. Hart and was restricted to that part of the coast between Long Beach, west of the entrance of Barkley Sound, and Esperanza Inlet. Much interesting and valuable material was obtained and when sorted out at the Nanaimo station, the Director, Dr. W. A. Clemens, kindly forwarded the hydroids to me for examination.

While there was nothing very new or very striking in the collection, it was of considerable interest, particularly from the standpoint of distribution. In all, 52 species were recognized. Of the 43 species previously reported, 29 appeared in this collection, and hence, there were 23 species constituting new distributional records for the area. The number of species known from the region has therefore been increased to 66. Assuredly, this is not nearly the total number existing on the coast, but it gives some idea of the richness of the hydroid fauna.

Of the 66 species now reported, all but seven — *Eudendrium vaginatum*, *Hydractinia mulleri*, *Abietinaria anguina*, *Sertularella tanneri*, *Sertularia furcata*, *Aglaophenia pluma* and *Plumularia plumularoides* — have been reported from the east coast of Vancouver Island or the Puget Sound region. Only two species appeared in

the collection that were not listed and described in the paper "Hydroids of the Vancouver Island region" (Fraser, 1914, *Trans. Roy. Soc. Can., Vol. VIII*). The one, *Aglaophenia pluma*, has not been reported nearer than Coronado Island, near the boundary between United States and Mexico, hence its range has been very much extended. The other, *Plumularia plumularoides*, has been collected at the entrance of Bull Harbour, Hope Island, Queen Charlotte Sound ("Monobrachium parasitum and other west coast hydroids", Fraser, 1918, *Trans. Roy. Soc. Can., Vol. XII*), so near the west coast of Vancouver Island, that it might be included with it.

The list of 66 species gives some indication of the inshore hydroid fauna of the west coast of Vancouver Island from the entrance of the strait of Juan de Fuca to Esperanza Inlet. Northwest of this region it is practically unexplored and oceanographic conditions are such that an abundance of hydroids may be expected in this area. By dredging farther out from shore, it is probable that many other species would be obtained.

Since the general distribution of nearly all the species has already been given, nothing is to be gained by repeating this, but it seems well worth while to record the distribution on the west coast of Vancouver Island as far as it is now known.

SPECIES AND DISTRIBUTION

Family ATRACTYLIDAE

Bimeria gracilis Clark. — Off Sydney Inlet, 25 fathoms.

Garveia annulata Nutting. — Port Renfrew, Ucluelet, Clayoquot Sound (Fraser); Estevan Point, low tide, Bajo Reef, low tide, bar off Indian village, Esperanza Inlet, low tide.

Garveia groenlandica Levinsen. — Swiftsure Shoal (Fraser); off Sydney Inlet, 28 fathoms.

Family EUDENDRIDAE

Eudendrium californicum Torrey. — Port Renfrew, Ucluelet (Fraser); Estevan Point, low tide, near Maquinna Point, low tide, off Nootka Island, 38 fathoms, Bajo Reef, low tide.

Eudendrium insigne Hincks. — Clayoquot Sound (Fraser); bar off Indian village, Esperanza Inlet, low tide.

Eudendrium vaginatum Allman. — Swiftsure Shoal (Fraser).

Family HYDRACTINIDAE

Hydractinia milleri Torrey. — Port Renfrew (Fraser).

Family TUBULARIDAE

Tubularia harrimani Nutting. — Port Renfrew (Fraser).

Family CAMPANULARIDAE

Campanularia groenlandica Levinsen. — Port Renfrew, Swiftsure Shoal (Fraser); off Sydney Inlet, 28 fathoms.

Campanularia integra (McGillivray). — Off Clayoquot Sound, 40 fathoms, off Sydney Inlet, 25 fathoms, 28 fathoms, Estevan Point, low tide, near Maquinna Point, low tide, Bajo Reef, low tide.

Campanularia urceolata Clark. — Found almost everywhere that dredging has been done on the west coast of Vancouver Island, in depths to 45 fathoms.

Campanularia verticillata (Linn.). — Clayoquot Sound (Fraser); off Long Beach, 10 fathoms.

Campanularia volubilis (Linn.). — Ucluelet (Fraser).

Clytia edwardsi (Nutting). — Off Clayoquot Sound, 10 fathoms, 38 fathoms.

Clytia kincaidi (Nutting). — Off Bajo Reef, 50 fathoms.

Eucopella caliculata (Hincks). — Near Maquinna Point, low tide.

Eucopella everta (Clark). — Port Renfrew (Fraser); off Nootka Island, low tide, 38 fathoms, Bajo Reef, low tide, bar off Indian village, Esperanza Inlet, low tide.

Gonothyræa gracilis (Sars). — Off Clayoquot Sound, 30 fathoms, 38 fathoms, south of Flores Island, 30 fathoms, off Bajo Reef, 75 fathoms.

Obelia borealis Nutting. — Ucluelet (Fraser).

Obelia dubia Nutting. — Off Sydney Inlet, 25 fathoms, off Nootka Island, 38 fathoms.

Obelia gracilis Calkins. — Near Maquinna Point, low tide, Queen's Cove, low tide.

Obelia longissima (Pallas). — Clayoquot Sound (Fraser); off Sydney Inlet, 25 fathoms,

south of Flores Island, 24 fathoms, south-west of Flores Island, 33 fathoms, Nootka Island, low tide.

Obelia surcularis Calkins. — Catala Island, low tide.

Family CAMPANULINIDAE

Calycella syringa (Linn.). — In most of the localities where dredging was done, from Long Beach to Esperanza Inlet, in depths to 50 fathoms.

Egmundella gracilis Stechow. — Off Clayoquot Sound, 30-38 fathoms.

Family HALECIDAE

Halecium annulatum Torrey. — Port Renfrew, Ucluelet (Fraser); off Long Beach, 10 fathoms, off Sydney Inlet, 25 fathoms.

Halecium corrugatum Nutting. — Clayoquot Sound (Fraser); off Clayoquot Sound, 25 fathoms.

Halecium densum Calkins. — Port Renfrew, Ucluelet (Fraser).

Halecium halecinum (Linn.). — Ucluelet, Swiftsure Shoal (Fraser).

Halecium tenellum Hincks. — Swiftsure Shoal (Fraser); off Clayoquot Sound, 38 fathoms.

Halecium washingtoni Nutting. — Off Clayoquot Sound, 38 fathoms, south of Flores Island, 25 fathoms, 30 fathoms.

Halecium wilsoni Calkins. — Ucluelet (Fraser); off Sydney Inlet, 28 fathoms, Estevan Point, low tide, Catala Island, low tide, bar off Indian village, Esperanza Inlet, low tide.

Family LAFOEIDAE

Filellum serpens (Hassall). — Off Long Beach, 30 fathoms.

Grammaria abietina Sars. — Swiftsure Shoal (Fraser).

Lafoea dumosa (Fleming). — Ucluelet, Port Renfrew (Fraser); off Sydney Inlet, 28 fathoms.

Lafoea fruticosa Sars. — Swiftsure Shoal (Fraser).

Lafoea gracillima (Alder). — Ucluelet, Port Renfrew (Fraser); off Clayoquot Sound, 32 fathoms.

Family SERTULARIDAE

Abietinaria abietina (Linn.). — Ucluelet, Swiftsure Shoal, Clayoquot Sound (Fraser); off Long Beach, 10 fathoms, off Sydney Inlet, 28 fathoms, Nootka Island, low tide, off Bajo Reef, 50 fathoms.

Abietinaria amphora Nutting. — Port Renfrew, Ucluelet (Fraser); bar off Indian village, Esperanza Inlet, low tide.

- Abietinaria anguina* (Trask). — Port Renfrew, Ucluelet (Fraser); Estevan Point, near Maquinna Point, Bajo Reef, all at low tide.
- Abietinaria filicula* (E. & S.). — South of Flores Island, 30 fathoms.
- Abietinaria greeni* (Murray). — Port Renfrew, Ucluelet (Fraser); Nootka Island, Bajo Reef, both at low tide.
- Abietinaria traski* Torrey. — Swiftsure Shoal, Clayoquot Sound (Fraser); off Clayoquot Sound, 25 fathoms, off Sydney Inlet, 28 fathoms.
- Abietinaria variabilis* Clark. — Swiftsure Shoal (Fraser); off Long Beach, 10 fathoms, off Clayoquot Sound, 30 fathoms.
- Hydrallmania distans* Nutting. — Claninnick, Clayoquot Sound (Fraser); at a large proportion of the dredging stations between Long Beach and Esperanza Inlet, in depths to 75 fathoms.
- Selaginopsis mirabilis* (Verrill). — Off Clayoquot Sound, 30 fathoms, off Bajo Reef, 38-45 fathoms.
- Sertularella conica* Allman. — Port Renfrew, Ucluelet, Swiftsure Shoal, Claninnick (Fraser); Bajo Reef, Nootka Island, both at low tide.
- Sertularella pinnata* Clark. — Estevan Point, low tide.
- Sertularella polyzonias* (Linn.). — Clayoquot Sound (Fraser).
- Sertularella rugosa* (Linn.). — Off Long Beach, 38 fathoms, off Sydney Inlet, 25 fathoms.
- Sertularella tanneri* Nutting. — Swiftsure Shoal (Fraser).
- Sertularella tricuspidata* (Alder). — Off Clayoquot Sound, 30 fathoms, 70 fathoms, off Bajo Reef, 23 fathoms.
- Sertularella turgida* (Trask). — Port Renfrew, Ucluelet, Clayoquot Sound (Fraser); in nearly all the shore collections made between Long Beach and Esperanza Inlet.
- Sertularia furcata* Trask. — Ucluelet, Clayoquot Sound (Fraser); Estevan Point, Nootka Island, Bajo Reef, all at low tide.
- Thuiaria argentea* (Linn.). — South of Flores Island, 30 fathoms, off Clayoquot Sound, 65 fathoms.
- Thuiaria dalli* Nutting. — Ucluelet, Claninnick (Fraser).
- Thuiaria fabricii* (Levinson). — Off Long Beach, 10 fathoms, off Clayoquot Sound, 28 fathoms.
- Thuiaria similis* (Clark). — Claninnick, Port Renfrew (Fraser).
- Thuiaria thuiarioides* (Clark). — Clayoquot Sound, Swiftsure Shoal (Fraser); off Sydney Inlet, 25 fathoms.

Family PLUMULARIDAE

- Aglaophenia pluma* (Linn.). — Off Bajo Reef, 23 fathoms.
- Aglaophenia struthionides* (Murray). — Port Renfrew, Ucluelet (Fraser); in nearly all shore collections made between Long Beach and Esperanza Inlet.
- Plumularia corrugata* Nutting. — Off Clayoquot Sound, 30 fathoms.
- Plumularia goodei* Nutting. — Port Renfrew (Fraser).
- Plumularia lagenifera* Allman. — Port Renfrew, Ucluelet, Amphitrite Point, Swiftsure Shoal (Fraser); in nearly all shore collections made between Long Beach and Esperanza Inlet.
- Plumularia plumularioides* (Clark). — Catala Island, low tide.
- Plumularia setacea* (Ellis). — Ucluelet (Fraser); off Bajo Reef, 38-45 fathoms, bar off Indian village, Esperanza Inlet, low tide.

IS THE EASTERN GOLDFINCH (*Spinus tristis tristis*) DOUBLE-BROODED? A FOURTH STUDY OF ITS HOME LIFE

By HENRY MOUSLEY



IN REFERENCE to my previous studies, more especially, the third,¹ or last one of September, 1931, it has always struck me as somewhat of an anomaly that in the case of the present species and the Cedar Waxing (*Bombicilla cedrorum*) — two species which in general habits are so much alike — our text books

invariably speak of the former as single-brooded and the latter as double-brooded. This is a mistake, I think, for whatever term is applied to the one that same term should apply equally to the other also, in view of which I would suggest they both be considered single brooded as a rule, with very often a double brood in September. I have been coming to this conclusion for some little time based principally on the fact of having come across so many nests

¹ Can. Field-Nat., 46:200, Dec., 1932.

-- lately occupied -- of both species respectively close together. This was so in the case of my third study a second -- lately occupied -- nest having been found very close to the one forming the basis of the study. Now it will no doubt be remembered that no male was ever seen at this nest, from which I surmised that he had either met with an accident, or else had joined a band of roving Goldfinches, which were very numerous at the time, and which I often heard in close proximity to the nest, but could never properly see, owing to my "hide out" being under somewhat dense foliage. Had this not been so, and could I have seen all round me, as was the case this year (1933), I should no doubt have been able to state definitely, that the male had certainly joined a roving band that, however, of his own progeny -- the first brood -- which he was undoubtedly attending to, the same as will be seen later, the male in the present study was doing. The whole thing is perfectly clear to me now, and only at the time lacked the confirmation obtained this year, in forming a correct solution to the situation, which solution, is here offered, in the present fourth study of the home life of our Eastern Goldfinch. The nest, which was situated 4 feet up in the forks of a small birch tree, was found on August 20, practically completed, as on the following day it contained its first egg, four more being added on consecutive days, until the 25th, when the nest contained its full complement of five eggs. Ten days now elapsed or, until September 4, before the first young was found breaking through its shell at 3 p.m. Just previous to this, a male accompanied by a party of five young, was seen to perch in a nearby tree, not very far from another nest -- which from its fouled condition had evidently lately been occupied -- this being situated 5 feet up in a small maple tree, and only 18 feet from the one in the birch tree. On the following day, the 5th, this male again put in an appearance, accompanied as before by the five young, but as on the previous day, he made no attempt to approach the nest, during the two and one half hours I spent watching the female. It was not until the following day, however, when I spent over five hours at the nest, that the idea dawned upon me, that this male was undoubtedly the partner of the female I was watching, he being engaged attending to their first brood. I formed this opinion from the fact that, whenever, the female left the nest, he and the five young, always returned with her -- not only on this day, but throughout the rearing of this

second brood -- but he never once approached the nest. He would often perch, however, in a little poplar tree at the back of the nest, and sing as the female fed the young, and on some occasions I saw him feed his charges not only there, but also, as they sat perched on some telegraph wires, which ran alongside the nest. On one occasion, the female while perched on these wires, was solicited for food by one of these youngsters, but she absolutely refused to feed it, in fact, drove it off with vigorous pecks. I have seen this same kind of thing enacted with Cedar Waxwings, late in September, when two nests were found in close proximity to one another, and if we are to consider these birds as double-brooded, why not Goldfinches? Their habits -- as already remarked -- are almost identical, both being fond of going in flocks, both late nesters, whilst the sexes of both show great affection for one another. In addition to this, they nest in very similar situations, and often very near to one another, and it is no uncommon thing to find nests containing young birds ready to fly, while others, again, at the same time, contain fresh eggs. The nesting season with both, lasts from June to late September, and even, in some extreme cases, into early October. Of course, in many cases, these late broods merely represent a second, or even, third nesting, owing to the loss, or destruction of the first nest, or set of eggs, and cannot, in any way, constitute the species as double-brooded. On the other hand, are we in a position to pick out one of these species in particular, and say definitely, that it is either single, or double-brooded? I think not, the best solution probably being -- as previously suggested -- to consider both as generally single-brooded, with often a double brood, in late Summer, or early Fall. After all, it is more or less a matter of opinion, I presume, based on personal experience in the field, but whatever conclusion we may arrive at, I for one consider it should apply equally to both, there being no sharp differentiation possible between the two species, so far as I can see, which is the main purport of this paper. It is not my intention to go into the details of each day's happenings at this nest, as they will be found tabulated in the annexed table of summaries, as well as compared with those of the 1931 nest. I might mention, however, that all the essential happenings were in every way almost identical with those of previous studies, and it is for this reason, that I have refrained from again going into them in detail.

In conclusion, allow me to apologize for a small error which crept into the table of summaries of the 1931 nest, the addition of the time spent by the female brooding, reading as 12 hours 30 minutes, instead of 14 hours 30

minutes, thus making the length of each brooding 18 1-2, instead of 16 minutes, which errors have been rectified in the present table of summaries, of both nests, as herewith appended.

Species	Period of Observation 1933	Hours	No. of Times fed by Female	No. of Times brooded by Female	Total Time brooded by Female	Times faeces eaten by Female	Times faeces removed by Female	Remarks
Eastern Goldfinch (<i>Spinus tristis</i> <i>tristis</i>).	Sept. 4							1st egg hatched at 3 p.m.
	5	2½	2	2	1.15	2		
	6	5¼	7	9	4.32	7		
	7	2½	4	5	1.05	4		
	8	5¼	7	8	1.56	7		
	9	5¼	9	11	2.14	9		
	10	6¼	11	12	1.22	11	1	
	11	5¼	8	5	.30	8	3	
	12	6¼	9			4	5	
	13	6¼	10			3	7	
	14	5½	7				3	
	15	5¼	7				1	
	16							Not visited
	17	6¾	10					
	18	2¼	3					Young left the nest.
Totals		66	94	52	12.54	55	20	
Totals	Sept. 5-18. 1931	66	80	47	14.30	56	18	

	1933 nest	1931 nest
Average rate of feeding over the whole period—once every	42.1 minutes	—once every 49.5 min.
Average rate of feeding for the first seven days—once every	40.3 minutes	—once every 43.1 min.
Total time brooding	12 hours, 54 minutes	—14 hours. 30 min.
Number of times brooded	52	—47
Average length of each brooding	14.9 minutes	—18 5 min.

A NEGLECTED WORK ON THE SHELLS OF QUEBEC

By A. LA ROCQUE



EARLY WORKS on Canadian Conchology are rather scarce so we should make the most of the ones we have. When Whiteaves asserted (1862:452) that "the papers published by Mr. Bell and Mr. D'Urban in the *Canadian Naturalist*.

together with another in the *Canadian Journal* by Mr. Williamson, contain all the published information on this subject" (mollusca of Lower Canada) he was omitting a paper which in many ways is one of the most remarkable we have. This was probably due to the scar-

city of the periodical in which it was published as Whiteaves, from all accounts, was a man incapable of doing an injustice. The paper in question is by Mrs. Sheppard and dates back to 1830. It was published in the *Transactions of the Literary and Historical Society of Quebec* for 1829, the full title being "On the Recent Shells which characterize Quebec and its environs".

Whiteaves was not alone in his neglect of Mrs. Sheppard. Although listed in Binney's bibliography (1863) it is not mentioned by Provancher (1890) and is absent also from many more recent works in which it should be found. Amongst those to quote Mrs. Sheppard are Dall (1905) and Simpson in his *Synopsis of Naiades* (1900).

We know very little about Mrs. Sheppard. She was probably the wife of William Sheppard, who, with his brother Peter, was a founder-member of the Literary and Historical Society. In the list of founders he is merely

William Sheppard, Esquire, but later his articles are by "Honble Wm. Sheppard, of Woodfield". He was three or four times president of the Society and the centenary volume (1924) mentions that his portrait is in the possession of the Society. In 1841 we find him listed with the corresponding members. It is probable, therefore, that the Sheppards lived in Canada some ten years. No doubt the archives of the Literary and Historical Society of Quebec could furnish more details on the Sheppards, the length of their stay and "Woodfield", their home.

Being concerned more particularly with the identity of the species mentioned in her paper, the writer has attempted to make a list of her species and their modern equivalents, which is given below. Had Mrs. Sheppard given the names alone, some of her records would be unrecognizable but fortunately she added short descriptive notes which in many cases enable one to identify the species. The species listed, with their modern equivalents are as follows:

- | | |
|-------------------------------|---|
| 1. <i>Unio sinuata</i> | ? <i>Margaritana margaritifera</i> (Linn.) |
| 2. <i>Unio radiata</i> | <i>Lampsilis radiata</i> (Gmel.) and perhaps some other species. |
| 3. <i>Unio nanca</i> | <i>Elliptio complanatus</i> (Dillw.). |
| 4. <i>Helix hortensis</i> | <i>Cepaea hortensis</i> (Müll.). |
| 5. <i>Helix</i>? | <i>Polygyra monodon</i> (Rackett). |
| 6. <i>Corocolla dubia</i> | <i>Anguispira alternata</i> (Say). |
| 7. <i>Succinea amphibia</i> | <i>Succinea ovalis</i> (Say) or near. |
| 8. <i>Planorbis spirorbis</i> | ? <i>Menetus exacuus</i> (Say) |
| 9. <i>Planorbis alba</i> ? | ? <i>Gyraulus</i> or ? <i>Planorbula</i> . |
| 10. <i>Physa fontinalis</i> | <i>Physa</i> sp. |
| 11. <i>Physa subopaca</i> | <i>Physa</i> sp. |
| 12. <i>Lymnaea stagnalis</i> | <i>Lymnaea stagnalis jugularis</i> (Say). |
| 13. <i>Lymnaea palustris</i> | <i>Stagnicola palustris</i> (Müll.) and possibly other species of the same genus. |
| 14. <i>Paludina</i>? | <i>Campeloma decisum</i> (Say) or near. |
| 15. <i>Paludina</i>? | <i>Goniobasis</i> or <i>Pleurocera</i> , more probably the former. |

1. *Unio sinuata*: This is indentified as *Margaritana margaritifera* with some doubt. Of it Mrs. Sheppard says: "Shell ovate, oblong, compressed, sinuous; on the upper part thick, cardinal tooth lobed, and striated. Inhabits the Island of Orleans, not very common. I have sometimes found very small pearls in this species; it is a coarse large mother of pearl shell with a brown epidermis". There are quite a few species which might fit into the above description if some of their characteristics are disregarded. For instance *Elliptio complanatus* if one disregard the rich purple nacre; but Mrs. Sheppard noticed this and could differentiate *E. complanatus* which

she aptly describes under *U. nanca* (see below). She says nothing of laterals so if we suppose that her *U. sinuata* did not have any, the field is considerably narrowed. *Lasmigone costata* sometimes has a brown epidermis but the fluted posterior part of the shell would doubtless have been noticed, so that on the whole it is more probable that she really had *Margaritana margaritifera*. On the other hand I know of no other record of this species living in the St. Lawrence itself, although there are many for its tributaries. It may be that Mrs. Sheppard's shells were dead, washed on the beach of the Island of Orleans from some of the rivers up-

stream, which would account for their scarcity as compared with the other species which most probably live in the immediate vicinity.

2. *Unio radiata*: It is very probable that Mrs. Sheppard had some genuine *radiata* but since she fails to mention *Lampsilis ventricosa* and *L. siliquioidea*, both recorded subsequently for the St. Lawrence, it is possible that she lumped all three species under the one name. Her description is as follows: "shell obovate, convex, rather depressed, thin, transversely striated, broader on the anterior side than on the other; epidermis yellow, longitudinally rayed." This is quoted, probably from Lamarck; the following observations are her own: "Found on the beach at the Island of Orleans; the shell is much thicker than those from Saratoga, and is pink or flesh colour within."

3. *Unio nanca*: "Shell transversely oblong, beaks depressed, lateral; tooth deeply canaliculated."

"This species, much more common than either of the foregoing is likewise an inhabitant of the Island of Orleans; the shell is violet or clay colour within, and is rarely rayed, it is much lengthened the transverse way, and covered with a black or dark brown epidermis, under which is mother of pearl."

From the above this could be only one species, viz. *Elliptio complanatus*. It is possible, however, that specimens of *Ligumia recta* and *Elliptio dilatatus* may have been included. But the "violet or clay colour" combined with commonness would point to *Elliptio complanatus*.

4. *Helix hortensis*: There seems no reason to doubt this identification since none of the native species have the same striking colours. However, Whiteaves does not mention the species for Quebec. Provancher (1890:125) gives "Cap Rouge, Lyster, Anticosti, îles de la Madeleine et dans toute l'Europe" Hanham (1897:98) cannot have found it in Quebec since he took the trouble of introducing specimens from Gaspé and says: "I see no reason why this locality and climate should not suit *H. hortensis* L. as it has without doubt, the other introduced species". If we accept Mrs. Sheppard's record, it would seem that *C. hortensis* was to be found at Quebec as late as 1829 but died out some time between that date and the 1860's. It would be interesting to know if the species is to be found there now, as it has long been known for various localities along the St. Lawrence.

5. *Helix*.....?: "Shell thin, conoidal, perforated; spire very flat; margin of the lip reflected. Common in the same place with the

above (bank near the plains of Abraham); it is a much less shell, with a brown epidermis; the penultimate whorl has an elevated white ridge near the aperture, which appears to be some remains of the last year's lip."

The size (much less than *hortensis*), the brown epidermis, the commonness, the reflected lip, perforated umbilicus, conoidal shape and flat spire would point to *Polygyra monodon*, possibly variety *cava*, and this is strengthened if we assume that the "remains of last year's lip" is the white, lamellar parietal tooth.

6. *Corocolla dubia*: Mrs. Sheppard reproduces Lamarck's description, the significant (for us) passage being "shell.. on the upper part, with a sharp angular periphery". She goes on to say: "De Lamarck would, I think, range it under *corocolla*, and until it be ascertained to have been previously described might be called

Corocolla dubia. Shell orbicular, largely umbelicate; spire flat, whorls transversely striated, horn colour, spotted with brown. Common in the spring on the bank with the two foregoing shells; it is rather a pretty shell, often variegated with white and brown".

Any collector familiar with Canadian shells will recognize *Anguispira alternata* (Say) as did Dall (1905:49). Say's species was described some twelve years earlier in a paper which was probably not accessible to Mrs. Sheppard.

7. *Succinea amphibia*: This is most probably *Succinea ovalis* Say since Mrs. Sheppard says of it: "shell ovate, thin, pellucid, yellowish; spire short, dilated at the lower part, subvertical. Inhabits gardens on the St. Louis road; it is horn coloured, and very transparent."

Succinea retusa (Lea) could hardly be found in gardens and *Succinea avara* Say has an undilated spire and is far from transparent.

8. *Planorbis spirorbis*: "one side flat, the other subumbelicated, reverse; horn coloured.. Found in abundance in the water near Etchemin. If the "water near Etchemin" was a pool separate from the river, the species referred to may have been *Menetus exacuus* (Say) (one side flat, the other subumbelicated). If Mrs. Sheppard was familiar with the English *P. spirorbis* and had both a *Gyraulus* and a *Menetus* to name she would probably call the *Gyraulus P. spirorbis* and the *Menetus Planorbis alba*? (No. 9). But she distinctly states that her *Planorbis alba*? is "umbelicated on both sides" which is more like a *Gyraulus*, or possibly *Planorbula*. On the whole *Menetus exacuus* seems the most likely in this case.

9. *Planorbis alba*? : "Shell umbelicated on both sides; upper part of whorls flat, lower convex; aperture wide and angular. Found with the foregoing, but not so common, it is the *Helix alba* of Linnaeus, but, is not among De Lamarcks species". As stated above, this is either a *Gyraulus* or a *Planorbula*.

10. "*Physa fontinalis*: reverse, oval, transparent, smooth, horn coloured; spire short, sub-acute. Not very common, but is sometimes met with on the beach at the Island of Orleans."

11. "*Physa subopaca*: Shell reverse, oval, semipellucid, grayish yellow; spire short, acute. This species is rather more common than the foregoing, they are often found together at the Island; it resembles *fontinalis* but is not so transparent. It is yellow without, and white within."

The only difference mentioned between these two species is one of degree, viz. transparency. It would be hard to say what the modern equivalents are, but it may well be that a large collection from the Island of Orleans would clear up the problem.

12. *Lymnaea stagnalis*: "Found abundantly at Sorel". There is no reason to doubt this identification and although I have seen no specimens from Sorel, it is most likely that they belong to the subspecies *jugularis* (Say). Note the spelling of *Lymnaea*.

13. *Lymnaea palustris*: That the species is correct is beyond doubt. The habitat is typical, viz. temporary pools formed by melted snow. It would be interesting to know if M. S. Sheppard found her two *Planorbis* here also; in that case one of them would be *Menetus excavatus* without doubt.

14. *Paludina*.....? : "Shell white, epidermis olive; spire the length of the aperture; last whorl inflated. Inhabits the Island of Orleans".

15. *Paludina*.....? : "Shell pale buff; spire longer than the aperture; top obtuse. Found with the foregoing on the beach at the Island; the whorls are not so much inflated as those of this genus generally are, but I think it would not range under any other; it has bluish bands of gray round the top of the whorls."

No. 14 is certainly a *Campeloma*; whether *decisum* or another species must remain undecided until the genus is re-studied thoroughly. At present specimens from the Island of Or-

leans and indeed the whole Lower St. Lawrence drainage would be called *decisum* but certain well-marked varieties if not species exist in Quebec which still await study.

No. 15 is probably a *Goniobasis*, *livescens* or near. The obtuse top might exclude the possibility of its being a *Pleurocera*.

Whiteaves' note on *Melania niagarensis* Lea (1863:102) is of peculiar interest when compared with the above; "St. Lawrence, from Quebec to Montreal. At Quebec I obtained only the pale yellowish, unbanded variety."

To Mrs. Sheppard, then, goes the honour of publishing the first list of Quebec shells. Six undoubted species and nine doubtful ones are listed which is remarkably good considering the books at her disposal and the state of conchology at that time. It is hoped that her work will soon be recognized by the naming of a Canadian species in her honour.

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NOTES AND OBSERVATIONS

SPARROW HAWK (*Falco s. sparverius*) CAPTURING A HORNE LARK (*Otocoris alpestris praticola*). — On April 21, 1934, while driving slowly along the county roads near Guelph, Ontario, the writer, accompanied by K. Nielsen, was a witness to the capture of a Horned Lark by a Sparrow Hawk. Noticing a sudden flash to the left, my attention was attracted to a hawk dropping vertically over a grassy field and out of sight behind a knoll. A moment later it reappeared, carrying a bird in its talons and alighted on a fence post. We attempted to approach the hawk but did not get close before it flew. Again it alighted in a field but took flight as we persisted in pursuit. The victim could be seen struggling to escape. For the second time, the hawk alighted on a fence post where it was promptly attacked by a Meadowlark. Again after taking flight, it alighted once more in the field. By now confusion reigned for the luckless hawk. Four horses grazing close by took fright and galloped off across the field, two crows flew over near the disturbed hawk and, furthermore, the two human intruders persistently harassed the bird so that it flew again and released its victim which dropped to the ground. We immediately went to the place where it had fallen and upon our approach, the bird flew up and was identified as a Horned Lark. It flew rather unsteadily for a short distance before alighting in the grass. We collected the bird which proved to be a female of the prairie race. It had been but slightly injured by its capture. The belly was quite bare and it was apparently an incubating bird. The fact that the hawk was not allowed sufficient time when perched to dispatch its victim probably induced the release of its prey. — C. E. HOPE, *Royal Ontario Museum of Zoology*.

THE FORCE OF EXAMPLE. — Every year the sapsuckers visit the maple tree just outside my window. Their visits are not always welcome, for whereas I am glad to see wild life so close, as I work, year after year, the tree is left bleeding and more disfigured.

On April 14th this year, a sapsucker came as usual and industriously set to work at making his rows of pits and sipping the sap as quickly as they filled up. As he worked I noticed three English sparrows watching him as closely as they could get, perched on the vine that is trained up the trunk of the tree. There is nothing

unusual about English sparrows gathering about a strange bird, even a native species, especially one so picturesquely and grotesquely garbed as our yellow-bellied sap-sucker. But they were, it seemed, more than usually interested in his actions, while he, in true woodpecker style, minded his own affairs and went on with pecking and drinking.

Suddenly he quit and flew to another tree, the next on his rounds I suppose. To my surprise the sparrows one after another flew down clinging sideways to the rough bark of the tree in an awkward unwoodpecker way deliberately sipped the sap from the pits made by the sapsucker — clearly a case of observation if not actual example.

Now the question comes up why have not other birds learned this trick as a habit long ago. There must be many birds which every spring either see the sapsucker at work or come upon the results of his work — pitted and bleeding tree-trunks, in the course of their searching for food. The brown creeper, the nuthatches, the black and white warbler and the whole woodpecker family habitually cling to tree-trunks. Yet we do not hear that any of these have acquired the habit. It remained for the enterprising, practical and observant English sparrow to see a chance to pick up a living where others failed.

But does not the newcomer in a strange land often succeed by finding and availing himself of opportunities overlooked by the natives? — STUART L. THOMPSON.

CHRISTMAS BIRD CENSUS. — The Bird Census Committee wishes to remind any interested readers to take a Christmas Bird Census on some day between December 20 and 28, and send a report of it to the Editor as promptly as possible. For the kind of report desired, please see published reports of previous years and discussion in *The Canadian Field-Naturalist* for September, 1933, pages 112-116.

MIGRATION OF SNOW GEESE. — It should be noted that the great migration of Snow and Blue Geese referred to in the article by Mr. L. H. Beamer published on page 137 of the November 1935 issue took place in the year 1934. — EDITOR.

AN EXTRALIMITAL RECORD OF THE AMERICAN MAGPIE IN SASKATCHEWAN. — Records of Magpies [*Pica pica*] occurring in areas far removed from their normal range are occasionally made. In order to lend further data which might be of interest in explaining these occurrences an additional case is here noted.

From a letter to the writer from Mr. M. MacLean, Post Manager of the Revillon Freres Trading Company, at Brochet, Reindeer Lake, Saskatchewan, the following is quoted, — "The priest here shot a strange bird this fall [letter dated October 12, 1934], seems to be a magpie, head like a crow, black and white, tail about eight inches long with a green sheen to it. Cree Indians recognized it as the egg-eater, though they had not seen the bird before".

There can be no doubt of the identity of the bird from the above description. The normal limits of the range of the species in Saskatchewan are several hundred miles to the south. — L. L. SNYDER, *Royal Ontario Museum of Zoology*.

WINTERING BIRDS IN ALBERTA. — Following is a list of birds observed in Red Deer, Alta., during the week beginning on Christmas Day, 1934.

The weather was very cold, 40° below zero early Christmas morning and ranging from 30° to 2° below all the rest of the week. Constant small snow storms added to the three or four inches of snow already on the ground. There was little wind but some fog.

Birds observed at the feeding station. Black-capped Chickadee. Long-tailed from 20 to 24. Very difficult to count because of ceaseless activity. Downy Woodpecker, 3 individuals, 1 male 2 females. The pair may be Nelson's as breasts are very white. One female is very smudgy on breast, probably the Eastern sub-species.

Hairy Woodpecker, 1 pair, male and female. Probably the Northern, very large and very white.

Blue Jays — *Cyanocitta cristata cristata* — 3 individuals.

Magpie, American — 4 individuals.

House sparrow — about 6.

White-winged Crossbill, — on Dec. 28th only. Flock of about 24 eating seeds of spruce cones. They were shy and have not re-appeared so far.

Observed about half a mile distant, in heart of the town:

English sparrows, 30.

Evening Grosbeak, Eastern, 16.

Chickadee — Black-capped — long-tailed, about 5 individuals. — M. P. COLE.

REVIEWS

SHEEP AND BEAR TRAILS, *a hunter's wanderings in Alaska and British Columbia*, by John P. Holman, 43 illustrations, Frank Walters, New York, 1933.

This story of the long trail in search of big game, and concerning the finding of it, is more than that, for the author tells in an attractive fashion of the country he travelled through, and the ways of the wild as he saw them. The first incidents recounted are those of a hunt for white sheep in the Kenai peninsula of Alaska, then

follow in interesting succession accounts of hunting grizzlies in British Columbia, particularly on the Atnarko branch of the Bella Coola River, and of another hunting journey up the Kitlope River. The author gives an excellent description of the country he visits and details of value to future travellers. At Lonesome Lake on the Atnarko River he met Ralph E. Edwards and in the concluding chapter tells, among other things, of Mr. Edwards' care of the swans which winter near his home. — H. L.

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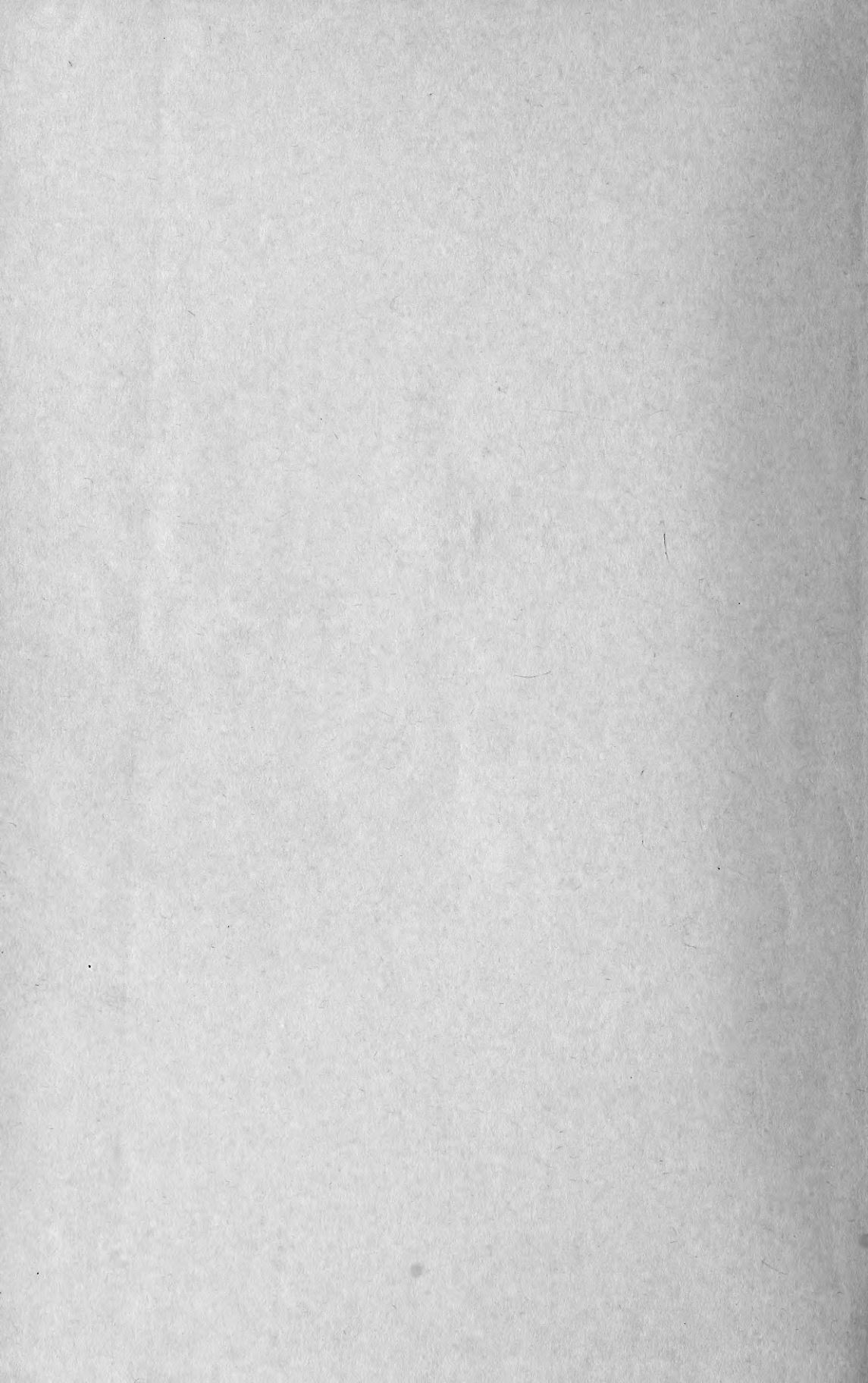
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